

TROPICAL DISEASES BULLETIN

ISSUED UNDER THE DIREC-
TION OF THE HONORARY
MANAGING COMMITTEE

VOL 46 (Nos 1-12)
JANUARY—DECEMBER, 1949

London
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, W C 1

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES

Chairman E. D. Friels, C.M.G. D.S.O. O.B.E., M.B., B.S.
(Chief Medical Officer Colonial Office)

Professor Patrick A. Buxton, C.M.G., M.A., M.R.C.S., L.R.C.P. D.T.M. & H., F.R.S.
(representing the Royal Society)

Lieut.-General Sir James Bennett Haecce, K.C.I.E., O.B.E., M.D. F.R.C.S.E., K.H.S.,
I.M.S. (retd.)

Sir Wilson Jameson, G.B.E., K.C.B., M.D. M.D. F.R.C.P. M.I.P.
(representing the Ministry of Health)

Professor G. Macdonald, M.D., M.R.C.P. D.P.H., D.T.H.

Professor J. M. MacIntosh, M.D. F.R.C.P. D.P.H.

Sir Philip Mason-Baker, C.M.G., D.S.O. M.D. F.R.C.P., D.T.M. & H.

Sir Edward Mellanby, G.B.E., K.C.B., M.D. Sc.D. F.R.C.P. F.R.S.
(representing the Medical Research Council)

E. R. A. Merrett, C.B.E., M.D., F.R.C.P. F.R.S.E.

Brigadier G. S. Parkinson, C.B.E., D.S.O. M.R.C.S., L.R.C.P. D.P.H., late R.A.M.C.

J. B. Siddons, C.M.G. M.A. (of the Colonial Office)

Secretary J. C. Botton (of the Colonial Office)

STAFF OF THE BUREAU

Director Charles Wilcock, M.D. M.R.C.P. D.T.M. & H.

Assistant Director H. J. O'D. Burke-Gaffney O.B.E., M.D.

Secretary R. L. Sheppard, O.B.E.

Winifred F. Coventry

Alma D. Crump

Emily M. Duggan

John A. Goodchild

Freida Harrison

Joan E. D'Arcy Hart

J. W. Pringley

Doris H. C. Taylor

LIST OF ABSTRACTERS

- A R D Adams MD I R C P D T M
 G C Ainsworth BSc Ph D
 D J Bauer MB BChir Ph D
 T Bedford DSc Ph D
 D S Bertram B.Sc. Ph D
 J H Birkinshaw DSc, IIC
 J C Broom MD
 Professor J J C Buckley, DSc
 H J O D Burke-Gaffney OBE MD
 J K Bussine Ph D BSc
 Professor P A Buxton, CMG, MA
 MRCS, I R C P D T M & H FRS
 H G Calwell MD, D T M & H
 J I Conson OBE MD, DPH
 D T M & H
 Professor Guy P Crowden OBE TD,
 DSc MRCP
 Professor J C Cruickshank MB, Ch B
 D T M
 J T Dunan, I R C S L R C P (Ire)
 D T M & H
 G M Lindsay CBL, DSc MD I R C P
 J D Lutton MA BSc Ph D MB, Ch B
 D T M
 P C C Gannham MD MRCS L R C P
 DPH
 M Gelfand MD MRCP
 Professor R M Gordon OBE MD Sc D
 I R C P DPH
 C J Hackett MD PhD MRCP
 D T M & H
 H J Harding DM
 Lieut-Col W I Haynes CIL MA MD
 F R C S I M S (retd)
 Miss M Henson
 St. Patrick Hospital C P I M C D S
 I R S
 I Hawkey DM D T M
 Lectr. A P H C H P DSc Ph D
 I R S
 Professor J H Henson MA Sc D Ph D
 I R S
 C A H C D S
 Lieut-Col L H Henson CIL MSc
 MD I R C P I M S (retd)
 G L H MD MS
 H S Leeson F R E S
 D J Lewis, MA
 E. M. Lounce, MB, M R C P DPH
 D T M & H
 F O MacCallum, B.Sc., MD L M S P E I
 Professor G Macdonald MD, DPH
 D T M
 Professor B G Macgrath B.Sc., D Phil
 MB BS
 Sir Philip Manson-Bahr CMG DSO
 MD, F R C P D T M & H
 P F Mattingly
 Maj-Gen Sir John W D Megaw ACIF
 DSc, MB BCh I M S (retd.)
 B Moore BSc MB BCh BAO
 F Murgatroyd MD FRCP
 L E Napier CIE FRCP
 T E Osmond BA MB
 Lieut-Col R Passmore MA DM, I M S
 (retd)
 Maj-Gen Sir Leonard Rogers AC S I
 CIE MD FRCP FRCS FRS
 I M S (retd)
 Sir H Harold Scott ACMG MD
 FRCP DPH D T M & H
 C F Shelton MD, MRCP D T M & H
 R L Sheppard OBE
 Professor H E Shortt, CIE MD DSc
 D T M & H I M S (retd)
 Dean A Smith OBE, MD D T M & H
 Professor E. T. C. Spooner MA MD
 G Stuart OBE, MD DPH
 F Windle Taylor MD DPH
 Maj-Gen. Sir John Taylor CIE DSO
 MD DPH I M S (retd)
 R Ford Tredre, MD DPH D T M & H
 J C Waelch MD
 F Norman White CIE MD DPH,
 I M S (retd)
 Charles Wilcock, MD MRCP,
 D T M & H
 G S W MD I R C P DPH
 H T H Wilson MB MRCS MRCP
 D T M
 Miss A. H. I. Wootton OBE MD
 MRCP

CONTENTS

SUMMARIES OF RECENT ABSTRACTS (1948)

Cholera	1-5	Plague	.. 597-601
Helminthiasis	687-695 791-796	Trypanosomiasis	419-425
Leishmaniasis	.. 509-51	Typhus Group of Fevers	857-896
Leprosy	.. 993-999	Yellow Fever	101 102
Malaria	195-204 301 314		

SECTIONS

Amoebiasis and Intestinal Protozoal Infections	.. 30-42, 144-146, 257-261, 361-367, 465-470, 546-549, 632-637, 740-745, 828-835, 936-943, 1031-1045, 1145-1148
Bartorellosis	.. 135-136, 354-355, 678 1027
Blackwater Fever	18 120-122, 336, 448, 523-530, 616-617, 810-811, 913 101
Book Reviews	180-194, 294-300, 406-408, 490-596, 678-686, 783-790, 881-886, 988-991, 1099-1101, 1191 1196
Cholera	36-40, 143, 257, 358-361, 461-465, 631-632, 738-740, 826-828, 935-936, 1029-1031
Deficiency Diseases	71-77, 158-165, 277, 279, 388-391, 439, 565-566, 657-658, 766-770, 860-861, 962, 964, 1072, 1073, 1166-1167
Dengue and Allied Fevers	30, 137-139, 458-459, 629-630, 777 728
Dermatology and Fungus Diseases	83-84, 166-168, 281, 284, 394-397, 494-497, 569-572, 777, 780, 868-871, 968-969, 1077, 1081, 1170-1176
Dropsy Epidemic	866
Entomology and Insecticides	General 97, 98, 171, 177, 287, 293, 403-412, 499-501, 578-584, 677-676, 875-878, 974-9 6, 1087, 1089, 1186-1188
Hematology	77-81, 165-166, 280, 397, 393, 489-493, 566-568, 661-666, 771-775, 863-865, 966-967, 1073-1076, 1167 1169
Heat Stroke and Allied Conditions	84-86, 168, 169, 284-285, 497, 671-672, 780-781, 871
Helminthiasis	53-71, 150-157, 265-277, 376-388, 480-489, 553, 565, 641-657, 751, 766, 844-859, 946-961, 1054-1072, 115 1166
Laboratory Procedures	95-96, 177, 413, 502, 976-977, 1090
Leishmaniasis	21, 22, 126-129, 41, 44, 340-343, 449-450, 535-536, 6 1-623, 714-715, 815-817, 974-976, 1018, 1071, 1137 1134
Leprosy	45-53, 146-149, 263-265, 368-376, 476-470, 552, 553, 638-641, 745-751, 840-844, 943-946, 1040-1044, 1143-1157
Malaria	6-18, 103-120, 205-211, 314-315, 425-448, 513-521, 601-616, 695-711, 797-810, 896-913, 999-1011, 1103-11 7
Miscellaneous Diseases	85-91, 169-170, 236, 399-401, 498-499, 577, 578, 781-785, 871-874, 970-972, 1044-1047, 1182 1184

CONTENTS—cont

SECTIONS—cont

Ophthalmology, Tropical	667-671, 1081-1083, 1176-1179
Plague	31-36, 141-143, 255-257, 357-358, 460-462, 545-546, 630-631, 736-738, 825-826, 934-935, 1029, 1143-1144
Protozoology, General	92, 170-171, 286-287, 401-403, 874-875, 972-973, 1184-1186
Rabies	139-141, 253-255, 356-357, 459-460, 543-545, 728-736, 824-825, 933, 1028-1029, 1139-1143
Relapsing Fever	42-45, 262, 367, 470-472, 835-838, 1045-1049
Reports, Surveys and Miscellaneous Papers	96-100, 178-180, 413-418, 502-505, 585-589, 676-677, 785-788, 879-880, 977-988, 1090-1098, 1188-1191
Sprue	77, 279-280, 391-392, 658-661, 770-771, 861-863, 964-965, 1073
Trypanosomiasis	18-21, 122-126, 221-242, 336-340, 448-449, 530-535, 617-621, 711-714, 811-814, 913-924, 1012-1018, 1127-1132
Typhus Group of Fevers	22-30, 129-135, 244-253, 343-354, 450-457, 536-542, 623-628, 715-727, 817-823, 927-932, 1021-1026, 1135-1138
Ulcer, Tropical	86-88, 285-286, 397-398, 781-783, 969-970, 1083-1084, 1179-1181
Venoms and Antivenes	81-83, 280-281, 393-394, 493-494, 568-569, 775-777, 866-868, 967-968, 1076, 1169-1170
Yaws	45, 472-476, 549-552, 839, 1049-1050
Yellow Fever	136-137, 355, 457-458, 542-543, 629, 823-824, 932-933, 1027, 1139
Index of Authors or Sources	1197-1234
Index of Subjects	1235-1288
Index of Countries	1289-1295

ILLUSTRATIONS

Chart illustrating the typical response to Chloromycetin of a patient with scrub typhus	28
Chart illustrating the "effective range" or distance between dams along a stream for control of <i>A. minimus</i> by flushing	217
Diagram of liver, blood and mosquito cycles of <i>Plasmodium cynomolgi</i>	444
Chart illustrating the daily cases and deaths in the cholera epidemic in Egypt from September to December 1947	462

ERRATA

Vol. 46, No. 2, p. 184 last para For "The average annual cost amounted to \$ 43 per house, or 0.637 per caput" read "The average annual cost amounted to \$5.43 per house, or \$0.637 per caput"

Vol. 46, No. 3 p. 272, in translation of LEON's title for *R. equatorius* read *R. equatoriensis*.

Vol. 46, No. 8, p. 753, in the abstract of the paper by HALAWANI *et al.*, the symbol "mgm." should read "µgm" in the following positions

para 1 lines 14 and 17

para 2, lines 9 and 10.

Vol. 46, No. 12, p. 1119 In the abstract of the paper by GAHAN DOWNS & CELIS the word "not" on the seventh line from the end should be omitted. The sentence beginning on the previous line should therefore read "It is evident that the DDT applications did kill enough adult mosquitoes"

TROPICAL DISEASES BULLETIN

Vol 46

1948

[No 1]

SUMMARY OF RECENT ABSTRACTS*

I CHOLERA

Epidemiology

ARDOL (p 175) describes the origin and course of the recent epidemic of cholera in Egypt. In one month there were 8,408 cases and 3,230 deaths, and the disease was spread from its original focus by escaping settlers and by contaminated dates. In the *Lancet* (p 175) it is stated that main water supplies do not seem to have played any part in spread, but that badly constructed shallow wells did so to some extent. Treatment of patients by replacement of water and salt was the most important therapeutic measure, sulphonamides were on the whole disappointing. The value of vaccination was confirmed. In another article in the same issue of the *Lancet* the point is made that existing quarantine measures have been based on an incubation period of 5 days, and an average period of 5 days for excretion of vibrios, the rapid advance of air travel seems to demand a significant alteration of these measures.

In the *Chronicle of the World Health Organization* (p 333) there is an account of the Egyptian outbreak of cholera, which increased for 5 weeks, and then after declined. In 8 weeks there were 20,877 cases and 10,265 deaths. A noteworthy point is that the disease failed to establish itself in any town provided with a satisfactory water supply and an adequate sewage system in spite of repeated introduction from the villages.

BIRALD and KIVUL (p 426) of the World Health Organization discuss the epidemiology of cholera in relation to the Egyptian outbreak. The source of the epidemic is still obscure but there is a suggestion that a carrier of the vibrio may have travelled to Egypt from India by air. The focal point was overcrowded with people not normally resident there, and they straggled and spread the disease widely. Large cities escaped the outbreak because water supplies and sanitation were satisfactory. Graphs of the outbreaks of 1902 and 1947 are very similar, yet in 1902 there was no vaccination, which was widely used in 1947. FAYLOR (p 599) makes the point that there is no definite information on how cholera reached Egypt, but that it was presumably by air or sea.

WAHID (p 998) found 16 positive results in 600 contacts examined in Egypt, 12 of them were carriers for only 2 days, and the longest period was 7 days. Only 3 contacts showed evidence of the disease.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948, v 45. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

UNDERWOOD (p. 599) has written an account of the history of cholera in Great Britain.

Aetiology

SHRIVASTAVA and WHITE (p. 334) have examined various strains of vibrios. They quote their results showing that for instance an Inaba strain can be produced by growing an Ogawa strain in the presence of Ogawa mono-specific antiserum. They hold that the existing classification of the vibrios is taxonomically invalid and that it is probably merely expressing the range of natural variation of a single organism. The paper should be read in full. WHITE (p. 599) again expresses the opinion, formed as a result of his own recent work, that the known types of cholera vibrios are not separate species, but phases of a single species. He agrees with TAYLOR that in 311 strain magnetinable with O group 1 serum there was no evidence of choleric activity (except possibly in one strain).

REIDMAN (p. 74) thinks that in cholera epidemics either a single type strain or different serological types of the cholera vibrio are concerned. He discusses the possibilities.

The Horain strain of *V. cholerae* from Egypt was of Inaba type. GOMAR and MARKAWI (p. 705) point out that it does not live long inside dates, probably because acid is produced by fermentation of carbohydrates. The same authors (p. 706) examined the viability of the vibrio on various articles of food and clothing: there was a high correlation between the time of collection of dates and the time of the outbreak. Experiments by GOMAR *et al.* (p. 807) in Egypt indicate that the cholera vibrio lives no longer than 24 hours in sea water at 18°C. but that there may be an antibacterial substance in the sea-water which can be destroyed by autoclaving but cannot be removed by Seitz filtration.

BLAS (p. 176) having studied the metabolism of glucose by non-proliferating vibrios, thinks that the ratio of CO₂ produced to glucose consumed is too variable to be useful in distinguishing *V. cholerae* from the El Tor vibrio. GALLUT (p. 177) has continued his researches on the utilization of glucose by *V. cholerae* under aerobic conditions. He sets out some characters of the vibrio and shows that though it is normally a facultative anaerobe it is adaptable to strict aerobiosis during the phase of growth. He (p. 600) discusses the mechanism of the cholera red reaction especially as regards the part played by glucose: the discussion should be read in full.

GALLUT and GHARAR (p. 427) have previously demonstrated that the cholera toxin shows two fractions, one comprising a large molecule which is the O antigen, the other having a small molecule. They now show that the latter has no antigenic power.

Recognizing that the usual tests are not useful for differentiation of the true cholera and the El Tor vibrios, TANAKA (p. 706) has devised a serological test in which he uses the Damang O-antiserum (probably relating to Hikojima type vibrios) with a solution of sodium carbonate as diluent. At certain strengths of the sodium carbonate El Tor vibrios are agglutinated, but not *V. cholerae*. In another test without serum, but with sodium carbonate and mercuric chloride solutions, the cholera vibrios flocculate but the El Tor vibrios do not.

YU (p. 73) describes a modification of his phenolphthalein-starch medium for the isolation of *V. cholerae*. The new modification is a plate medium, and the vibrio grows in 18-24 hours and gives a clear greenish-yellow zone around the colonies. Other organisms tested did not give this zone or were inhibited by the malachite green and roxalic acid which the medium contains.

GOMAR (p. 690) describes two ingenious methods for isolating *V. cholerae*: detail are given in the abstract.

GOHAR and MAHRAWI (p 705) suggest the use of potassium tellurite, 1 in 50,000, in all-ahne peptone water for suppression of intestinal organisms which tend to overgrow the cholera vibrio. They have found it better than the other bacteriostatic substances examined.

Advice on the bacteriological diagnosis of cholera (on lines which have been noticed from time to time in this *Bulletin*) is given in a short article in the *Monthly Bulletin of the Ministry of Health and Public Health Laboratory Service* (p 336).

Immunity Studies

BURROWS *et al* (p 178) have been able to infect mice with cholera vibrios suspended in a solution of mucin, and have used this technique in a protection test of immune rabbit serum. Protective antibody may be in part anti-endotoxic, but is not necessarily identical with O agglutinin. There is little justification for drawing a close analogy between experimental infection and human cholera. [The paper should be read in full.] In a later contribution BURROWS *et al* (p 335) deal with the antibody found in the fluid faeces of infected guinea-pigs (coproantibody). This seems to be identical with serum antibody, though it is not clear how it appears in the faeces; it has agglutinative and protective properties. The authors discuss the difficult subjects of intoxication, infection and immunity which arise from their experimental work. In a subsequent paper BURROWS and HAYES (p 598) show that serum globulin is normally excreted in urine and faeces, and that immune globulin can either be absorbed or excreted through the intestinal wall. The presence of coproantibody in the faeces of immunized animals is related to these processes.

Clinical Findings

MARRIOTT (p 208) has greatly clarified the symptomatology of cholera by describing the effects of depletion of water and salt respectively. SAFWAT and ADHAM (p 898) refer to this in pointing out that cholera presents a combination of the picture of both. In water depletion there is thirst, diminished urine, no diminution of plasma volume, no reduction of blood chlorides, but in salt depletion there is no thirst, no reduction of urine (until late), great reduction of plasma volume and of blood and urinary chlorides. Treatment must take these facts into account. Haemoconcentration is an indication for 400 cc normal saline for each degree above S.G. 1060, but for simple water depletion only water is needed, by mouth. Acidosis may require intravenous 4 per cent sodium bicarbonate.

EL-RAWI (p 900) gives an account of the signs and symptoms of cholera as he saw them in a large number of cases in a fever hospital in Egypt. He found that 50, 91.7 and 100 per cent of carriers were free of vibrios in 5, 10 and 15 days respectively. There were 84 healthy carriers in 2,035 contacts, and contacts rarely developed the disease. He gave 400 ml of normal salt solution intravenously for each degree of blood specific gravity over 1050. Sulphonamides seemed to have no effect.

BURGH (p. 48) notes the complication he found in cholera in Egypt. The commonest was heart failure in the acute stage or even in convalescence. Suppression of urine was common before the routine of treatment was fully established. Abortion, pneumonia and other conditions are mentioned. A syndrome of transient paralysis complicating cholera, and possibly due to disturbance of potassium metabolism resulting from mobilization of barium from the bone reservoir in dehydration is described from China by HUANG and MUO (p. 75). It resembles a form of barium poisoning seen in China.

ANDOT (p. 85) thinks that cholera tend to attack person with achistosomiasis, ankylotomiasis, amebiasis and malaria rather than those free from these infection and bases his argument on his own observation in Egypt. He remarks that it was seldom that more than one case occurred in one family.

Treatment

CARRUT (p. 70) reports on the Swi. medical mission in Egypt which set up a hospital of 25 beds in the Delta. Treatment consisted of intravenous glucose-saline (5-10 litres in 4 hours), hypertonic saline sodium bicarbonate for acidosis and infusions of plasma for hypoproteinaemia. The case-mortality rate was 70 per cent. against 50 per cent. elsewhere. A very active phase was isolated and used to differentiate the Egyptian cholera strains from El Tor and non pathogenic vibrios.

GOODYEAR and BEARD (p. 120) describe the successful treatment of acute renal failure by peritoneal irrigation, and in comment on this paper MARGRAUS suggests that this procedure may have value in the renal failure of blackwater fever and cholera.

SEAL (p. 515) tested sulphaguanidine under field conditions in India, during a number of small outbreaks of cholera. The result showed that the death rate in the sulphaguanidine group was only 1.5 per cent., against 43.5 per cent. in the controls. Most of the patients in the two groups were not given any other effective treatment but a small number received saline. In spite of this and of the fact that the test was not done on an alternate case basis the results are decidedly in favour of sulphaguanidine, stocks of which could be kept in villages for use in outbreaks of this kind. In a small outbreak in Burma STERNITZ (p. 334) reports a death rate of only 4 per cent. as a result of early massive intravenous infusion of glucose-saline and treatment of milder cases with sulphaguanidine. He thinks that the vibrio may have been of low virulence and that preventive inoculation may have contributed to the low death rate. LAWRIE (p. 1000) in India found that both sulphadiazine and sulphaguanidine were valuable in cholera, to about the same extent.

On the other hand, LARSEN *et al.* (p. 515) conclude from good clinical evidence that sulphadiazine has no beneficial effect in cholera, but an extended test showed that sulphaguanidine has considerable value. PASRICHA *et al.* (p. 601) have not found any favourable influence on the death rate by treatment with sulphasuxidine or phthalyl sulphathiazole.

BEATYAGAR *et al.* (pp. 516-601) write most favourably of their experience with the compound of sulphathiazole with formalin (known as compound 6257), which they used in 83 patients with only 3 deaths. These patients were treated in their own homes and no other treatment was given. The drug was given to a total dose of 25-30 gm. in 7 days for a man. There were no toxic effects, and the beneficial effects were usually apparent in a few hours.

Control and Isolation

In the *Chron. of the World Health Organization* (p. 174) is an important declaration of international health policy in relation to cholera. It deals with isolation of patients and observation, contact, disposal of dejects, disinfection,

control of travel, vaccination etc It deprecates panic and the over-hasty closure of frontiers, and recommends surveillance for vaccinated travellers and surveillance with medical examination for those who have not been vaccinated

KOPANARIS (p 602) gives an account of the steps taken in Greece to prevent the introduction of cholera from Egypt Travellers from Egypt by sea and air were admitted at one seaport and one airport only, and were examined and if necessary detained Vaccine was used on a large scale and special attention was paid to persons who lived under unfavourable conditions—sewage workers etc No fresh food was allowed to be brought from Egypt, and mails were disinfected

STRAUSS (p 334) discusses the potential danger to Palestine of the Egyptian outbreak, and SILBERSTEIN (p 334) the technique of preventive inoculation of heat-killed vaccine

KHALIL Bey (p 704) discusses the Egyptian outbreak and the sanitary reforms necessary to prevent repetition A pure water supply from tube wells is needed in most of the villages

HALAWANI and OMAR (p 707) have found that copper sulphate, 20–45 p p m in Nile water, is lethal to *V cholerae* It is extensively used to eradicate snail hosts of schistosomes in Egypt, and it has its place in the prevention of cholera

Moving religious fairs have long been connected with cholera in India, but RAO (p 896) describes one in Hyderabad in which the incidence was very low, probably because nobody was allowed to join it who had not been vaccinated, and because the wells on the route were treated with permanganate or bleaching powder and great care was taken with the food provided in the villages for these pilgrims

ADISESHAN *et al* (p 336) review the results of inoculation with a single dose of 8,000 million *V cholerae* (mixed Inaba and Ogawa) in 118 million persons in 2,350 villages in India, and compare the cholera experience in these and in a large number of control villages Incidence rates were 10 and 14 times as high in control as in inoculated groups and villages, and the results appear to provide proof of definite protection On the other hand, an enquiry into the results of this vaccination campaign made by CHANDRA SEKAR (p 337) who took as his unit the compact block of a village, inhabited by the depressed classes, showed results which, though still favourable to inoculation, were less so than those quoted above. He found that the attack rate in the control population was 2–4 times as high as in the inoculated

GOHAR and MAKKAWI (p 706) show that nearly 20 million people were vaccinated during the outbreak in Egypt, mostly with one dose of 8,000 million organisms, they do not draw conclusions as to the value of vaccination GOHAR (p 901) has used an alum-precipitated cholera endotoxoid vaccine in Egypt, which he gave as a single intradermal dose in order to ensure slow absorption Details of preparation should be sought in the original GOHAR and ISA (p 1000) describe their animal experiments with 5 types of vaccines or toxoids from an Egyptian strain of *V cholerae* These showed some evidence in favour of a mixture of equal parts of toxoid and vaccine, and the authors give details of the preparation of an alum-precipitated toxoid vaccine mixture

KORDI (p 901) gained the impression, from a study of vaccinated and non-vaccinated patients admitted to his hospital in Egypt, that vaccination conferred a definite degree of protection and lowered the fatality rate

Charles Wilcocks

MALARIA

YACOB M & SWAROOFF S. Preliminary Forecasts of the Incidence of Malaria in the Punjab. *Indian J Malariology* 1947 Dec. v 1 No. 4 491-501 1 chart.

In thirty districts of the Punjab the annual incidence of malaria from 1914 to 1943 was correlated with the rainfall in each month of the year. In nineteen of them there was a fair degree of relationship between the rainfall in either March (two districts) April (three districts) or May (14 districts) and the subsequent epidemic incidence. For each of these districts the regression equations were computed for connecting malaria with the rainfall in the specified month. They were used to predict the malaria incidence in 1944 1945 and 1946 and these predictions could be compared with the actually observed epidemic figures. The degree of accuracy attained was measured by correlating the predicted figures with the observed figures, the coefficients being 0.25 in 1944 0.78 in 1945 and 0.55 in 1946. The low figure in 1944 was due to unusual floods and waterlogged areas in some districts. The other coefficients are statistically significant. The equation enable forecast to be made two or three months earlier than has previously been possible and are recommended as a method of estimating the epidemic incidence to be expected.

[The degree of a relation between prediction and the actual epidemic is not sufficiently close to make the method very reliable in individual districts as indeed the tabulated figures reveal. It is noticeable that almost all the predictions are too high and this clearly call for further study. It is of course presumed that the rainfall and the later malaria incidence are linearly related and only one month's rainfall has been utilized. A multiple regression or a curvilinear equation might improve the answer though the data given do not make it very hopeful.]

A Bradford Hill

ZUJIGA, H & VIGILAN RIVAS A. Reconocimiento de malaria de la Ciudad de Santa Ana. Junio de 1946. [Malaria in Santa Ana, El Salvador.] *Bolet Sanitario* San Salvador 1946 Jan.-June v 4 No. 1/3 32-51 3 charts & 1 map.

The investigation the results of which are here reported, was undertaken in June 1946. The authors examined 1,134 persons, schoolchildren and others in the town, for splenic index and found 224 (19.7 per cent.) with enlargement. 661 were examined for parasites and 57 (8.6 per cent.) were positive, most with *P. falciparum* (74) next with *P. vivax* (13) *P. malariae* (4). 16 were not identified, there were no mixed infections recorded. Tables are given to show these indices in the 9 ward of the town. The splenic index was nearly the same in all, but the parasite index varied considerably and was highest in San Lorenzo, Santa Bárbara and Santa Lucía.

According to the statistical returns, malaria comes second or third among the causes of death in Santa Ana, the numbers in the quinquennium 1941-45 were 253 319 417 237 and 203 or per 10,000 inhabitants 24 35 45 24 and 21 respectively. The chief *Anopheles* present are *A. albanus* and *A. punctipennis* but the former only is said to be the malaria vector in the town.

H Harold Scott

CABALLERO A., with the technical assistance of C. G. DE PRATER. Mortalidad por malaria en Venezuela. I Bases estadísticas y distribución geográfica. [Malaria in Venezuela. Statistics and Geographical Distribution.] *Tratado Latinoamericano de Malaria* Venezuela 1946 Dec. v 10 No. 4 191-237 10 boxes.

The compilation of this paper (it is only the first of a series) must have entailed an enormous amount of work, but one is reminded of Tony Weiler's

pronouncement on his efforts to master the alphabet—whether it was worth while to go through so much to learn so little

The author has presented figures of the population, the births, the deaths from all causes and deaths from malaria and the rates of these for each of 36 years and for each of 21 States in Venezuela. There are seven line maps with shadings to show the mortality from malaria in the different States in successive quinquennia from 1910 to 1936. Much of the information is too detailed to be of more than local interest. Apart, however, from this, the figures as given lose much of their value because it is acknowledged that many births and deaths are not registered, so that the census is inaccurate, many deaths even when registered are not medically certified, there must be many cases of malaria not notified and, lastly, in many cases the cause of death is not known with certainty.

With these reservations in mind, serious as they are, but not the fault of, nor remediable by, the author, and not forgetting that fluctuations may be great from year to year, the States may be classified according to the malaria mortality into six groups: 1 Those with figures above 1,000 per 100,000—Anzoátegui, Carabobo, Cojedes. 2 Those with a rate of 750–1,000—Portuguesa. 3 With a rate of 500–750—Barinas, Guárico, Miranda, Monaga and Yaracuy. 4 With 250–500—Apure, Aragua, Falcón, Lara, Sucre and Zulia. 5 With 100–250—Bolívar, Trujillo and Trujillo. 6 Below 100—Mérida, Nueva Esparta and Distrito Federal. Speaking generally, malaria is worst on the plains then in order the valleys, the coastal districts and the south-east [but reference to the maps shows that there are exceptions to this].

H. Harold Scott

PILLI F. & VAN HOOFF L. Comportement de *Plasmodium falciparum* dans le derme chez l'enfant indigène [Behaviour of *Plasmodium falciparum*, In the Skin of African Children] Ann Soc Belge de Med Trop 1948, June 30 v. 28 No 2 273-7

The intradermal juice of 50 African children suffering from *Plasmodium falciparum* malaria was examined. The ages of the children varied from four months to four years. The material was obtained by scarifying the skin, expressing the serum and making films from the first drops of the exudate. The parasites from the skin were compared with those in the peripheral blood and a striking difference was noted. In the blood, practically only ring stages were seen; in the skin growth proceeded much further and parasites in various stages of development were encountered. Solid pigmented parasites were common in the skin smears and there was nearly one mature schizont per field of the thin film. The actual number of parasites did not differ in the two situations and merozoites were present in both. The authors conclude that the skin is a normal site of schizogony of *P. falciparum* and they note that the p. c. in the skin resembles that of the placenta or deep organs. They failed to find any forms suggestive of exo-erythrocytic development.

P. C. C. Garman

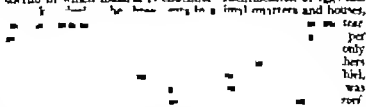
stages of *Plasmodium vivax* in man [this Bulletin 1948, v. 45, 462]. In previous work on monkeys, SHORTT, GARNHAM and MALAMOS (ibid. 388) had found that it was necessary to induce very heavy infection by the bites of large numbers of mosquitoes infected with *P. cynomolgi* and by injection of sporozoites at the same time. If the pre-erythrocytic stages were to be found easily. A similar technique was used in the experiment in man and Shute gives in detail the technique adopted for raising the colony of some 10 000 *Anopheles maculipennis atroferrus* (*A. labranchius atroferrus* in the Bates classification) needed for the experiment and for infecting the required number on the donor patient. The volunteer recipient was bitten by 1510 mosquitoes on one day and by 500 the following day and the crushed salivary glands of 200 were injected intravenously. These glands probably contained 9,000,000 sporozoites.

Full details of the procedures adopted should be sought in the original paper. (The author is not accurate in describing the developmental cycle of *Hepatosystus kochi* (misprinted *kochi*) as the same as that of *P. cynomolgi*. The wording of one paragraph implies that pre-erythrocytic forms of *P. vivax* had previously been found in the livers of monkeys by Garnham and by Shortt and Garnham; this, of course, is incorrect. Garnham described the exoerythrocytic hepatic stage of development of *Hepatosystus kochi* in the monkey and Shortt, Garnham and Malamos the pre-erythrocytic stage of *P. cynomolgi* in the monkey. The slip is obviously unintentional, but an unconstructed reader might receive a wrong impression.)

Charles H. Stocks

DEL VECCHIO G. & DEL VECCHIO I. Prime osservazioni sull'anofelismo in provincia di Salerno. [Preliminary Observations on Malaria in the Province of Salerno.] Boll. Soc. Ital. Biol. Sper. 1948 Jan. F b v. 24, Nos. 1/2 7-8. [Summary taken from Rev. Applied Entom., Ser. B, 1948 July v. 39 Pl. 7 109.]

An Anopheline survey was carried out in 1943-45 in nine communes of the Province of Salerno in which malaria is endemic. Identification of eggs laid



which occurred along the coast where breeding places on high summer current were available.

OLIFAN V. I. Periodicity in the Postembryonic Development of *Anopheles maculipennis* C. R. (Dobzh.) Acad. Sci. U.R.S.S. Moscow 1947 v. 55 No. 2 169-77 2 figs. 12 refs. [Summary taken from Rev. Applied Entom., Ser. B, 1948 Aug. v. 39, Pl. 8, 140.]

Larvae of *Anopheles maculipennis* var. *parvus* Flu. and *atroferrus* van Thiel, were reared in tap water with yeast, infusoria and flagellates as food, and their respiration and rate of growth were observed. Measurement of the stigmatic and cutaneo branchial respiration with a micro-parameter gave the consumption of atmospheric oxygen and of that dissolved in water respectively. The changes in respiration that took place with the increasing age in one set of test are shown on a graph. It was found that respiration did not increase

steadily with the age of the larvae but showed a succession of increasingly high peaks separated by depressions. As a rule, the depressions more or less coincided with the moulting periods, and the peaks with the middle of each instar. In some of the experiments, however, a peak was preceded by a deep depression in addition to that occurring during the moulting period. There was a particularly high peak in the third instar.

The growth of the larvae was studied by measuring their length each day and computing the true growth-rate to obtain a graphic representation of the changes that took place with age. The resulting curve showed a succession of decreasing peaks, indicating that the increase in length of the larvae with age was of an intermittent character, growth was considerably slowed down soon after the beginning of the third instar owing to accelerated differentiation, and this instar was preceded by unusually high mortality.

It is concluded that there is a definite rhythm in the intensity of respiration and growth in the larvae of *A. maculipennis* corresponding to profound changes in their metabolism and that the intensification of growth at the beginning of the third instar and of oxygen consumption in the course of it is suggestive of the particular importance of that instar. The periodicity observed in growth and metabolism is thought to be controlled by the rate of production of hormones.

STEYN, J. J. The Effect on the Anopheline Fauna of Cultivation of Swamps in Kigezi District, Uganda. *East African Med J* 1946, June, v 23, No 6, 163-9.

Kigezi is a densely populated mountainous district in south-west Uganda. It lies at an altitude of 6,000 feet and has an average annual rainfall of 39.13 inches. Famine is apt to occur during drought years, consequently drainage of the papyrus swamps in the valleys was commenced in 1942 with the object of extending the area available for cultivation. A great increase in the incidence of malaria followed and investigations showed that the following anophelines were present: *Anopheles christyi*, *A. marshalli gibbinsi*, *A. costaini* and *A. demelloni*.

Previous workers had already shown that *A. christyi* was the commonest anopheline in African huts in the area and dissections produced an average gland infection for this species of 2.36 per cent with a maximum at one place of 4.1 per cent out of 98 females dissected.

The present author, therefore, in 1944-45, made weekly collections of anopheline larvae by a standard technique in five areas in which were sixty actual or potential breeding places in uncultivated swamp and eighty-seven in cultivated portions. He also made weekly collections of adults in twenty-four African huts. Results of adult catches are not given, but an analysis of 2,922 larval searches in untouched swamps and 5,886 searches in the cultivated portions is tabulated. The figures show that after cultivation there was a decrease in the numbers of *A. marshalli gibbinsi*, an increase in *A. costaini* and a much greater increase in the output of *A. christyi*.

Several breeding places of *A. christyi* are noted, but it is pointed out that it breeds particularly in cultivated ditches and disappears from them when they revert to swamp, also in water in paths through papyrus and where papyrus has been cut down, but as the papyrus begins to grow again the numbers of larvae fall. The number of favourable breeding places was also greater in cultivated than in uncultivated swamps.

The author concludes that as the cultivation of swamps as at present practised in Kigezi greatly increases the breeding of *A. christyi*, the increased incidence of malaria in this area is largely due to this cause.

H. S. Leeson

GARNHAM P. C. C. WILSON D. Bagster & WILSON Margaret E. Malaria in Kigeri, Uganda. *J Trop Med. & Hyg.* 1948 Aug. v 51 No. 8 154-9

During a visit to Kigeri, in south-west Uganda, in September 1948 very high spleen rates were observed among all age groups of the population. A second visit was made in January 1947 to study this phenomenon and its relationship to *Anopheles christyi* recently recorded as a vector [above].

The area surveyed lies at an altitude of about 6,300 feet where the incidence of malaria had increased after intensive cultivation. Around Lake Banyonyi, the huts contained numerous *A. funestus* the dissected salivary glands of 275 females showed six with sporozoites (2% per cent) a few larvae of this anopheline were found among papyrus at the fringe of the lake. Huts in the Kigeri valleys where previous workers had found many *A. christyi* yielded only two specimens of this species and one *A. gambiae* one *A. funestus* nine *A. kingi* and three *A. marshalli* var *gibbatus*.

Spleen rates and parasite findings are tabulated and show that the spleen rates were high for such an altitude that the adult parasite rates were not very different from those in hyperendemic areas and that there was a high incidence of *Plasmodium malariae*.

The authors make some detailed suggestions, firstly for an investigation into the malaria situation to determine the part played in transmission by *A. christyi*, *A. gambiae* and *A. funestus* in such areas and secondly for certain experiments in anopheline and malaria control.

H. S. LERSON

GLAGOLEVA, E. M. [Ecological Studies on *Anopheles* Larvae in Tadzhikistan, Middle Asia. 2. Breeding Places of *Anopheles hyrcanus* Pall. and their Chemical Factors.] *Russ. Ent. URSS* 1947 v 29 No. 1 p. 109-18. [In Russian.] [Summary taken from *Russ. Applied Entom.* Ser. B 1945 July Pt 7 124.]

Anopheles hyrcanus Pall. is widely distributed and common in the lowlands in Central Asia. In Tadzhikistan it is abundant in low lying places in the valleys of the rivers Vakhsh, Kani-su and Ak-su and in the valleys of the Hindu Kush mountains its favourite breeding places being rice-fields and swamps fed by seepage from subsoil water lying close to the surface in which the water is slow moving heated by the sun and overgrown with floating and emergent vegetation and dense growths of reeds.

A study of the chemical composition of the water in typical breeding places was carried out in 1938-40 in rice-fields on four collective farms in three districts and a detailed account is given of the results. They showed that it was characterized by a low content of mineral (190-50 parts per million dry residue) a low degree of hardness a fairly high oxygen content (4.15-5.16 p.p.m.) a pH of 7.7-4 and a high temperature (30°C. [86°F.]) all typical of high-level subsoil water.

Larvae of *A. hyrcanus* unlike those of other species of *A. opheles* tolerate considerable quantities of both mineral and organic nitrogen and were not affected by about 4.34 p.p.m. nitrates in the water. In tests of various methods of reducing the mosquito population in rice-fields the introduction of organic fertilizers killed the larvae of all the species of *A. opheles* present except those of *A. hyrcanus*.

LERSON H. S. & THEODOR O. Mosquitoes of Socotra. *Bull. Entom. Res.* 1948 Aug. v 39 Pl. 2, 221-9 4 figs. (1 map) [15 refs.]

The paper contains an introductory account of the surface features and water supplies of the Island of Socotra. It seems that a fairly complete survey of

mosquitoes was carried out in the war period and that only two species of *Anopheles*, *A. dthali* var *wardi* and *A. culicifacies* var *adenensis*, were discovered. The former is here described as a new variety with an account of the adult male and female and of the structure of the larva. This insect is widely distributed in the island and occurs in water of many types. The following Culicines which might prove to be of some medical importance were found to be present: *Aedes vittatus*, *Culex fatigans* and *Culex sitiens*. *Aedes aegypti*, which had been recorded from Socotra years ago, was not encountered. The paper contains keys to adults and larvae.

- P A Buxton

DE BURCA, B & JACOB, V P Further Notes on Malaria in Fort Sandeman
Indian J Malariology 1947, Dec, v 1, No 4, 413-16

"In a survey carried out between mid-August and mid-October 1946 at Fort Sandeman, *A. stephensi* and *A. culicifacies* were found infected, gland infections in each case. No other mosquitoes occur in sufficient numbers to be of any practical importance.

"The Zhoob River was not considered to have any bearing on the malaria problem in this station during the period of the survey."

DE BURCA, B & FORSHAW, H W Winter Variations of the Larva of *A. fluviatilis* from Northern India and Bombay Presidency -*Indian J Malariology* 1947, Dec, v 1, No 4, 417-18

"A brief description is given of some winter variations noted in the larva of *A. fluviatilis* during the cold season of 1945-46 in North India (U P) and Bombay Presidency (Poona). A large proportion of larvae were found with branched outer or inner clypeals. A division of the outer clypeals with two equal branches was the commonest variation seen, and often this was unilateral."

SANDOSHAM, A A Identification of the Common Malayan Anophelines
25 pp, numerous illustrations 1945 Singapore

— The Identification of the Common Anophelines of Malai and Thailand
95 pp, 17 figs & 3 pls 1945 Singapore [Summary taken from *Rev Applied Entom* Ser B 1948, July, v 36, Pt 7, 112]

The first booklet comprises data on the morphology of the various stages of *Anopheles* in general and illustrated keys for the identification with simple equipment of the larvae and adults of both sexes of the 17 species of that genus that are common or important in Malaya, together with brief notes on their morphology, prevalence, biology and status as vectors of malaria there.

The second includes also most of the other information on *Anopheles* (except control measures) contained in the author's recent monograph on malaria in Malaya [this *Bulletin*, 1948, v 45, 1045] and in addition a list of the species and subspecies recorded in Siam and a summary of the available information on the morphology, prevalence, bionomics and status as vectors of malaria of ten species or subspecies common, widespread or important in Siam but not in Malaya. The keys to the larvae and females are amended to include these ten forms. The distribution of malaria and its probable vectors in Siam are discussed, mainly from the literature. Intense malaria in the hilly districts to the west of the central plain is associated with the breeding of *A. fluviatilis*, James, *A. culicifacies*, Giles, and *A. minimus*, Theo, and 14 or 15 other species occur in the area, including *A. barbumbrosus*, Strickl & Choudh, and *A. insulacflorum*, Sw & Sw, which are recorded from Siam for the first time.

GARTHAM P. C., C. WILSON D. Bagster & WILSON Margaret E. Malaria in Kigezi, Uganda. *J Trop Med & Hyg* 1948 Aug., v 51 No 8 145-9

During a visit to Kigezi in south-west Uganda, in September 1948 very high spleen rates were observed among all age groups of the population. A second visit was made in January, 1947 to study this phenomenon and its relationship to *Anopheles christyi* recently recorded as a vector [above].

The area surveyed lies at an altitude of about 6,300 feet where the incidence of malaria had increased after intensive cultivation. Around Lake Bunyonyi the huts contained numerous *A. funestus* the dissected salivary glands of 275 females showed six with sporozoites (2.2 per cent.) a few larvae of this anopheline were found among papyrus at the fringe of the lake. Huts in the Kigezi valleys where previous workers had found many *A. christyi* yielded only two specimens of this species and one *A. gambiae* one *A. funestus* nine *A. kingi* and three *A. marshalli* or *gibbatus*.

Spleen rates and parasite findings are tabulated and show that the spleen rates were high for such an altitude that the adult parasite rates were not very different from those in hyperendemic areas and that there was a high incidence of *Plasmodium malariae*.

The authors make some detailed suggestions firstly for an investigation into the malaria situation to determine the part played in transmission by *A. christyi*, *A. gambiae* and *A. funestus* in such areas and secondly for certain experiments in anopheline and malaria control.

H. S. LEESE

GLAGOLEVA, E. M. [Ecological Studies on *Anopheles* Larvae in Tadzhikistan, Middle Asia. 3. Breeding Places of *Anopheles hyrcanus* Pall. and their Chemical Factors.] *Rev. Ent. URSS* 1947 v 29 No 1/2 109-18. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1948 July Pt 7 194.]

Anopheles hyrcanus Pall. is widely distributed and common in the low lands in Central Asia. In Tadzhikistan it is abundant in low-lying places in the valleys of the rivers Vakhsh, Arvul-su and Ak-su and in the valleys of the Hissar mountains its favorite breeding places being rice-fields and swamps fed by seepage from subsoil water lying close to the surface in which the water is slow moving, heated by the sun and overgrown with floating and emergent vegetation and dense growths of reeds.

A study of the chemical composition of the water in typical breeding places was carried out in 1938-40 in rice-fields on four collective farms in three districts and a detailed account is given of the results. They showed that it was characterized by a low content of minerals (190-250 parts per million dry residue) a low degree of hardness a fairly high oxygen content (4.15-25.16 p.p.m.) a pH of 7.4 and a high temperature (30°C. (86°F.)) all typical of high-level subsoil water.

Larvae of *A. hyrcanus* unlike those of other species of *Anopheles* tolerate considerable quantities of both mineral and organic nitrogen and were not affected by about 4.24 p.p.m. nitrates in the water. In test of various methods of reducing the mosquito population in rice-fields the introduction of organic fertilisers killed the larvae of all the species of *A. opheles* present except those of *A. hyrcanus*.

LEESE H. S. & THEODOR O. Mosquitoes of Socotra. *Bull. Entom. Res.* 1948 Aug. v 39 Pt. 2, 221-9 4 figs. (1 map) [15 refs.]

The paper contains an introductory account of the surface features and water supplies of the Island of Socotra. It seems that a fairly complete survey of

mosquitoes was carried out in the war period and that only two species of *Anopheles*, *A. dithali* var *wardi* and *A. culicifacies* var *adenensis*, were discovered. The former is here described as a new variety with an account of the adult male and female and of the structure of the larva. This insect is widely distributed in the island and occurs in water of many types. The following Culicines which might prove to be of some medical importance were found to be present: *Aedes vittatus*, *Culex fatigans* and *Culex sitiens*. *Aedes aegypti*, which had been recorded from Socotra years ago, was not encountered. The paper contains keys to adults and larvae.

P A Burton

DE BURCA, B & JACOB, V P Further Notes on Malaria in Fort Sandeman
Indian J Malariology 1947, Dec, v 1, No 4, 413-16

"In a survey carried out between mid-August and mid-October 1946 at Fort Sandeman, *A. stephensi* and *A. culicifacies* were found infected, gland infections in each case. No other mosquitoes occur in sufficient numbers to be of any practical importance.

"The Zhob River was not considered to have any bearing on the malaria problem in this station during the period of the survey."

DE BURCA, B & FORSHAW, H W Winter Variations of the Larva of *A. fluviatilis* from Northern India and Bombay Presidency
Indian J Malariology 1947, Dec, v 1, No 4, 417-18

"A brief description is given of some winter variations noted in the larva of *A. fluviatilis* during the cold season of 1945-46 in North India (U P) and Bombay Presidency (Poona). A large proportion of larvae were found with branched outer or inner clypeals. A division of the outer clypeals with two equal branches was the commonest variation seen, and often this was unilateral."

SANDOSHAM, A A Identification of the Common Malayan Anophelines
25 pp, numerous illustrations 1945 Singapore

— The Identification of the Common Anophelines of Malai and Thailand
95 pp, 17 figs & 3 pls 1945 Singapore [Summary taken from *Rev Appld Entom* Ser B 1948, July, v 36, Pt 7, 112]

The first booklet comprises data on the morphology of the various stages of *Anopheles* in general and illustrated keys for the identification with simple equipment of the larvae and adults of both sexes of the 17 species of that genus that are common or important in Malaya, together with brief notes on their morphology, prevalence, biology and status as vectors of malaria there.

The second includes also most of the other information on *Anopheles* (except control measures) contained in the author's recent monograph on malaria in Malaya [this *Bulletin*, 1948, v 45, 1045] and in addition a list of the species and subspecies recorded in Siam and a summary of the available information on the morphology, prevalence, bionomics and status as vectors of malaria of ten species or subspecies common, widespread or important in Siam but not in Malaya. The keys to the larvae and females are amended to include these ten forms. The distribution of malaria and its probable vectors in Siam are discussed, mainly from the literature. Intense malaria in the hilly districts to the west of the central plain is associated with the breeding of *A. fluviatilis*, James, *A. culicifacies*, Giles, and *A. minimus*, Theo, and 14 or 15 other species occur in the area, including *A. barbumbrosus*, Strickl & Choudh, and *A. insulæflorum*, Sw & Sw, which are recorded from Siam for the first time.

doubtful value in diagnosis. While many observers think that a major operation or parturition may precipitate an attack of malaria, others doubt the importance of these factors.

The case histories of 1200 paretics treated in Amsterdam with induced malaria have been studied (almost all were apparently infected with *P. vivax* although one case of *P. malariae* is noted). This treatment aims to give the patient 10 or more pyrexial attacks but may fail because of an immunity from malaria previously accidentally acquired or arising from malaria therapy. During the course of infection with induced malaria, immunity may become so marked that after a few attacks the fever suddenly or gradually decreases and soon disappears altogether while in the blood parasites decrease or disappear completely. Inoculation with a different strain of *P. vivax* proved unsatisfactory in such cases and so did injections of adrenaline and application of artificial sunlight. Injections of milk, serum, pyril (bacterial proteins) dmelon (a suspension of *B. dysenteriae*) or sulpholine (a suspension of sulphur in oil) nearly always caused some degree of fever but even then had no influence on the number of parasites in the blood.

A summary of 24 paretic cases (one infected with *P. malariae*) whose immunity brought about a premature end to their treatment leads to the conclusion that if a patient develops resistance to malaria to such a degree that attack of fever ceases and parasites disappear nearly or completely provocative methods hardly ever succeed. Immunity often does not occur until the fever cure is interrupted by small doses (0.5 gm.) of quinine or benazaphenamine (0.15 to 0.3 gm.) according to the strain of *vivax* used.

The author concludes that once the infection has become latent in the patient's immunity it can rarely be activated by provocative measures within a reasonable time. In natural benign tertian malaria, approved provocative measures are far less important than is usually assumed. (In endemic areas there is always the difficulty if not impossibility of distinguishing between relapse and reinfection.)

C. F. Sherrin

LIMBOS P. Présence de schizontes et de gamètes de *Plasmodium falciparum* dans le sang périphérique vingt-deux heures après la naissance. Schizonts and Gametocytes of *Plasmodium falciparum* in the Peripheral Blood Twenty-two Hours after Birth.] *Ann Soc Belges de M d Trop* 1948 June 30 v 28, No. 2, 289-71

JORDAN, W S, JR Primary Attack of Vivax Malaria occurring Twenty-seven Months after Infection *New England J of Med* 1948, Sept 9, v 239, No 11, 397-9 [16 refs]

This paper records the case of a United States ex-serviceman who developed an attack of *P vivax* malaria in Cleveland, Ohio, in December 1947. He had served in New Guinea and the Philippines from 1943-1945, he had never been in hospital, nor had he had any symptoms suggestive of malaria.

The author produces arguments in support of the proposition that this was a primary attack of malaria and he discusses the literature regarding delayed primary attacks and late relapses.

This patient had taken suppressive mepacrine daily until his return to the United States in September 1945. It is suggested that the drug was responsible for the delayed attack of malaria, which had occurred as long as 27 months after the patient's last known exposure in an endemic area. It is added that such prolonged latent periods have not been reported in natural malaria, and that symptoms of the disease usually appear much earlier after the discontinuance of suppressive mepacrine. The author points out that rare cases of malaria have apparently been acquired in Cleveland, and that there is a possibility that this patient had contracted the infection locally but against this were the time of year (December), the known exposure in an endemic area, and the presence of splenomegaly. *H J O'D Burke-Gaffney*

See also p 96, WOLFF, Een eenvoudige snelle kleuring voor bloedonderzoek op malariaparasieten

See also p 21, CORKILL. Activation of Latent Kala-Azar and Malaria by Battle Experience, and p 22 CORKILL Activation of Latent Kala-Azar by Malaria and Relapsing Fever

WINCKEL C W F Le traitement du paludisme par la quinine [The Treatment of Malaria with Quinine] *Rev Paludisme et Méd Trop* 1948, Oct 15, v 6, No 53, 231-52, 2 figs [Refs in footnotes]

ASQUITH, R S, HAMMICK, D L & WILLIAMS, P L The Conversion of Mepacrine and Similar Derivatives of 5-Aminoacridines into Thioacridones by the Action of Hydrogen Sulphide *J Chem Soc* 1948, Aug 1181-3

DELAHOUSSE, J Essai d'étude de l'activité thérapeutique de la Nivaquine (3038 RP) sur le paludisme à *Plasmodium falciparum* [Therapeutic Effect of Nivaquine (3038 RP) in *Plasmodium falciparum* Malaria] *Bull Méd de l'Afrique Occidentale Française* 1947, v 4, No 3, 203-6

The author refers to the work on Nivaquine in the prevention and treatment of malaria in North Africa by DECOURT and SCHNEIDER [this *Bulletin*, 1948, v 45, 148, 868]

The present experiments were carried out in Segou, French West Africa, and concerned the treatment with Nivaquine of 46 cases of subtertian malaria. The ages of the patients [presumably all Africans] varied from 7 months to 45 years. Two-thirds of those treated were children under 8 years. The author points out that the experiments were of limited value, as they were of short duration, the patients were not severely ill and only Nivaquine for oral administration was available.

Dosage was based on an adult dose of 0.3 gm daily, given in the morning in capsules containing 0.1 gm each. The temperatures and thick blood films were taken every 12 hours. The results of 46 patients so treated are shown in a table.

doubtful value in diagnosis. While many observers think that a major operation or parturition may precipitate an attack of malaria others doubt the importance of these factors.

The case histories of 1200 paretics treated in Amsterdam with induced malaria have been studied (almost all were apparently infected with *P. vivax* although one case of *P. malariae* is noted). This treatment aims to give the patient 10 or more pyrexial attacks but may fail because of an immunity from malaria previously accidentally acquired or arising from malaria therapy. During the course of infection with induced malaria, immunity may become so marked that after a few attacks the fever suddenly or gradually decreases and soon disappears altogether while in the blood parasites decrease or disappear completely. Inoculation with a different strain of *P. vivax* proved unsatisfactory in such cases and so did injections of adrenaline and application of artificial sunlight. Injections of milk serum pyrifex (bacterial proteins) dmelcos (a suspension of *B. dysenteriae*) or sulphosine (a suspension of sulphur in oil) nearly always caused some degree of fever but even then had no influence on the number of parasites in the blood.

A summary of 44 paretic cases (one infected with *P. malariae*) whose immunity brought about a premature end to their treatment leads to the conclusion that if a patient develops resistance to malaria to such a degree that attacks of fever cease and parasites disappear nearly or completely provocative methods hardly ever succeed. Immunity often does not occur until the fever cure is interrupted by small doses (0.5 gm.) of quinine or neocarphenamine (0.15 to 0.3 gm.) according to the strain of *vivax* used.

The author concludes that once the infection has become latent by the patient's immunity it can rarely be activated by provocative measures within a reasonable time. In natural benign tertian malaria supposed provocative measures are far less important than is usually assumed. [In endemic areas there is always the difficulty if not impossibility of distinguishing between relapse and reinfection.]

C. F. Sherrin

LIMBOS P. Présence de schizontes et de gamètes de *Plasmodium falciparum* dans le sang périphérique vingt-deux heures après la naissance. [Schizonts and Gametocytes of *Plasmodium falciparum* in the Peripheral Blood Twenty-two Hours after Birth.] *Ann. Soc. Belge de Méd. Trop.* 1948 June 30 v. 28 No. 2, 769-71.

A case of congenital malaria due to *Plasmodium falciparum* is described from the Belgian Congo. The mother, an African primipara, had suffered from two attacks of malaria during pregnancy and had another attack on the first day of the puerperium when scanty asexual forms of *P. falciparum* were found in a thick drop of blood. Labour was uneventful though the placenta was unusually friable and had numerous blackish haemorrhagic patches. Twenty-two hours after birth, the child had generalized convulsions; quinine was given by mouth for a week and no further symptoms developed. The child's blood (thick drop-) showed scanty asexual and sexual parasites of *P. falciparum* and in a thin smear the latter forms alone. This is claimed to be the first record of the discovery of gametocytes of *P. falciparum* in the blood of a child within twenty-four hours of birth. [These findings strongly suggest that intra-uterine malaria occurred, because gametocytes of this species of malaria are rarely found in infections younger than a week. Unfortunately neither the blood of the umbilical cord nor that of the placenta was examined.] P. C. C. Garnham

endemic or hyperendemic to demand control. The country falls into three natural types, in one of which there is little malaria, in another of which it is predominantly carried by *A. fluviatilis*, a notorious anthropophilic vector mainly breeding in streams and seepages, and in the third it is carried by *A. culicifacies*, a more omnivorous species commonly associated with pools.

Much experimental work has been done in this district and malaria control by prevention of breeding has proved impossible at the cost which could be envisaged. DDT residual spraying was started in 1946-47. The dosage applied is 56 mgm DDT per square foot (2 oz per 1,000 square feet) in the form of a soap emulsion in water of a concentrated solution of DDT in medium kerosene extract, a petroleum fraction with a high aromatic content. In the areas affected by *A. culicifacies* applications were made, at intervals of six weeks, to all human and animal shelters up to ceiling height or the maximum reach of the operator. In those affected by *A. fluviatilis*, applications were made at intervals of two months to human and mixed habitations only up to a height of 10 feet. The cost of treatment worked out at two annas (2 7 pence) per person protected per round, or six annas (8 1 pence) per year.

The results have only been followed for one year. In the areas affected by *A. fluviatilis* where some previous control by other means had been carried out the spleen rate has dropped from 72.2 per cent to 14.4 per cent, and the parasite rate from 14.6 per cent to 3.5 per cent. In those affected by *A. culicifacies* where there had been no previous control the drop in the spleen rate is from 28.3 to 19.6 per cent and in the parasite rate from 7.5 to 4.4 per cent.

In both areas an effort was made to estimate the infant parasite rate, but controls were difficult as villages were only left unsprayed either because they were non-malarious or because they were very small and inaccessible. In the *culicifacies* area, no infections were found among 237 children examined, and in the *fluviatilis* area three were found among 367 children. For the reasons stated, the controls also showed very low figures of 2.1 per cent and 13.33 per cent.

G Macdonald

AFRIDI, M. K. & SINGH, D. A Scheme for the Control of Malaria in Villages in Delhi Province. *Indian J. Malaria* 1947, Dec, v 1, No 4, 423-40, 2 maps.

This paper gives a description of the organization but not the results of malaria control by residual DDT spraying in the villages of Delhi Province, which have a population of 292,102 subject in varying degrees to epidemic malaria at the height of the summer. Many surveys and many schemes of control have been carried out before, the most hopeful being by pyrethrum spraying. Under the new organization staff is more elastic than before. DDT is applied in a number of forms and doses varying from 50 mgm per square foot (2 oz per 1,000 sq ft) as a suspension, to 10 mgm (0.4 oz per 1,000 sq ft) as an emulsion. Two applications at intervals of six weeks are given to places where the spleen rate exceeds 20 per cent, and one application to places with spleen rates between 5 and 20 per cent. The estimated annual cost per caput works out at 7.8 annas (10.4 pence).

G Macdonald

RAO, V. V. & RAMAKRISHNA, V. Control of Breeding of *A. sundaus* by *Eichhornia* Cover. *Indian J. Malaria* 1947, Dec, v 1, No 4, 419-21.

"In Orissa Coast, the presence of *Eichhornia speciosa* does not inhibit the growth of other aquatic vegetation nor does it prevent the breeding of *A. sundaus*. The experiences are at variance with the observations made in Bengal." [See also this *Bulletin*, 1947, v 44, 564.]

Only one complete failure was recorded, that of a child of 7 years in whom schizonts persisted after 5 days of treatment. One child of 6 years relapsed after 4 weeks. Otherwise results were very satisfactory: temperatures returned to normal in an average of 30 to 36 hours, that is after the second dose and parasites disappeared from the peripheral blood in 30 to 60 hours after the third dose. No toxic effects were noted. The drug had no effect on gametocytes and required to be supplemented with rhodopraequine (re-embling plasmoquine). The treatment had little effect on splenomegaly.

The author thinks as a result of these experiments, that Nivaquine is almost equally as effective as mepracrine when given by the mouth. It has the advantages of low toxicity, of being colourless and of being put up conveniently in capsules.

II J O'D Burke-Gaffney

KING H. & WRIGHT JEAN. Antiplasmodial Action and Chemical Constitution. IX. Carbinolamines derived from 8:7-dimethylquinoline. *Proc Roy Soc Ser B* 1948 Oct 21 v 135 No. 890 71-82. (21 refs.)

See also p 28 NICHOLSON GAINES McWILLIAMS & YETTER. Combined Typhus-Malaria Control Residual Spray Operations with Five Percent DDT Emulsion.

AZIZ, M. Interim Report on Island-Wide Anopheles (Malaria) Eradication Programme for the Year 1947. *Cyprus Ann Med & Soc. Rep 1947* Appendix F pp. 18-32, 11 graphs & 1 map

The campaign for eradication of mosquitoes from Cyprus was begun in 1946 and the results of the first year's work are described in earlier papers [this Bulletin 1948, v 45 157]. The work in 1947 was extended to cover more than half the island including an area of about 2,000 square miles. The same methods were used but the staff had to be expanded from about 100 to over 400 to cope with the increased area. About 7½ tons of DDT dissolved in 270 ton of gas oil were used. Total expenditure amounted to about £75 000.

As the work proceeded through the year a greater and greater proportion of blocks in the eradication area were found negative for anophelines, whereas in the western end of the island in which merely regular control measures were maintained, a very high proportion of areas were positive. The checking of breeding and resting places was maintained in the Karpas peninsula (1946 eradication area). This remained nearly free throughout the year though a few blocks were reported positive in August.

As a result of the eradication scheme the malaria incidence as reflected in new acute cases, in blood and spleen indices has been brought almost to extinction in the eradication areas. It is however shown that there has been a gradual decline in malaria since 1944 even in the "control" area of the island.

J R. BURR

VISHWANATHAN D K. & RAMACHANDRA RAO T. Control of Rural Malaria with D.D.T. Indoor Residual Spraying in Kanara and Dharwar Districts, Bombay Province. First Year's Results. *Indian J Malariology* 1947 Dec., 1 No 4 503-42, 1 map & 3 chart (2 folding) (13 refs.)

This paper should be consulted in the original by all concerned in malaria control by DDT residual spray in the Eastern hemisphere. It constitutes a report on the largest successful scheme yet undertaken by the world. Work is being done in the districts of Bombay Province with a total population of 1,642,173 of whom 723,174 lived in places where malaria was sufficiently

It will be remembered that if one puts a male and virgin female of different species or sub-species of tsetse in a cage, complete failure to mate may occur. But in many cases, the insects pair though the female does not produce larvae occasionally hybrid offspring are produced which are nearly always sterile. A female which has paired with a "different" male cannot subsequently mate with a male of her own species and is in fact sterilized.

The paper sets out the results of more than a hundred types of crossing which involve the use of twelve species of *Glossina* and over three thousand individuals. Failure to produce living issue is due to a variety of causes, among them mechanical difficulties in pairing, failure in fertilization of the eggs, failure of the larva to develop, and so forth. The author makes use of a number of ingenious techniques. He says that individuals of two species will not mate unless the right musical note which comes from the wing beats of the female is produced; apparently it is possible to produce the correct note mechanically, and this is followed by pairings which would not otherwise occur. He has been able to remove eggs from a virgin female, mix them with sperm and incubate them on agar. If the parents are of the same species or sub-species, eggs will develop to the hatching stage in 100 per cent of cases.

In nature the range of certain related species overlaps: this is true for instance of *swynnertoni* and *morsitans* in a few places, and it is known that in the laboratory cross-pairing between them occurs readily with an effective sterilization of the female. In some of these areas aberrant adult tsetse have been taken which are probably natural hybrids. The author suggests that *Glossina newsteadi* may perhaps not be a species in the accepted sense of the word, but a naturally occurring hybrid between *G. caliginea* and either *pallicera* or *palpalis*. He discusses the status of sub-species in *Glossina* and the general relation of the three groups which are recognized in the genus to one another. The paper is of considerable interest to geneticists. P. A. Buxton

VILAIN, P. Note sur l'application du "Sélective Clearing" dans la région de Gaoua (Secteur spécial No 9) [The Use of "Selective Clearing" in the Gaoua Region] *Bull. Méd. de l'Afrique Occidentale Française* 1947, v 4, No 3, 289-91.

The paper describes the use of "selective clearing" against *Glossina palpalis* in the Gaoua region, Upper Volta Province, French West Africa. The author has received much help from MORRIS, whose work on similar problems in the Northern Territories of the Gold Coast is familiar [this *Bulletin*, 1946, v 43, 537-1947 v 44, 51]. Fly is confined to narrow riverside belts, in which contact with man is close, as people live on the waterside. By destroying certain types of waterside bushes and trees, tsetse may be exterminated. It seems that no great amount of clearing has yet been carried out. The cost is five to six thousand francs per kilometre, to include both banks of a stream.

P. A. Buxton

ROUBAUD, E. Transmission cyclique a Paris de *Trypanosoma congolense* Broden par des *Glossina palpalis* importées du Congo belge. Xenodiagnostic de l'infection transmise. [Cyclic Transmission in Paris of *Trypanosoma congolense* Broden, by *Glossina palpalis* Imported from the Belgian Congo. Xenodiagnosis of the Transmitted Infection.] *Bull. Soc. Path. Exot.* 1948, v 41, Nos 5/6, 405-13, 2 figs.

GUIBAUX, R. Observations cliniques sur l'emploi en milieu indigène du dimidium bromide dans un foyer actif de trypanosomiase bovine. [Observations in the Field of the Clinical Use of Dimidium Bromide (Phenanthridinium) in an Active Focus of Bovine Trypanosomiasis.] *Ann. Soc. Belge de Méd. Trop.* 1948, June 30, v 28, No 2, 179-88, 3 figs.

BALL G. H. Extended Persistence of *Plasmodium relatum* in Culture. Amer J Trop Med 1948 July v 28 No 4 533-6 3 figs.

Oocysts of *Plasmodium relatum* attached to the stomach wall of *Culex tarsalis* have been maintained in culture for 20 days. No development was visible in the cultured oocysts."

SALTER W. THOMLER H. & ANDRÉASO H. Ueber einen neuen, gegen Vogel-malaria wirksamen Verbindungstypus. [A New Compound effective against Bird Malaria.] Chem Berichte 1948 Jan. v 81 No. 1 1 19.

BLACKWATER FEVER

FLUSSER, J. & VEZALA, K. Bilikni boreška haemoglobiturická u malárii terciárny [A Case of Blackwater Fever and Benign Tertian Malaria. Casopis Lékařů Českých 1948 July 9 v 87 No 29 829-32 2 figs. & 1 chart.

The English summary appended to the paper is as follows —

"A typical case of blackwater fever in a 13 year old Rumanian immigrant who had not been treated for malaria yet is described. *Plasmodium vivax* was found in the blood. During treatment with Penicillin a rapid regression of the majority of signs was noted."

SKROGS L. T. Jr & LEO ARON J. R. Studies on an Artificial Kidney: 1. Preliminary Results with a New Type of Continuous Dialyser. Science 1949 Aug 27 125 13 1 fig. [16 refs.]

TRYPANOSOMIASIS

PACKCHANIAN A. The Fate of some Pathogenic Trypanosomes in *Triatoma* and *Ornithodoros*. Amer J Trop Med 1948 July v 28 No. 4 541-3

"1. *Trypanosoma brucei*, *T. gambiense* and *T. hippocampi* survived only four to six days in *Triatoma*. The majority of the flagellates were found dead after two to four days. At the end of ten days no flagellates were found viable by either microscopic examination or animal inoculation test.

2. *T. brucei*, *T. gambiense* and *T. rhodesiense* likewise failed to multiply in soft ticks (*Ornithodoros turicata*). The flagellates remained viable from two to four day but at the end of ten days all trypanosomes were found dead or disintegrated. The animal inoculation tests were likewise negative for seven days and after.

3. It is concluded that neither *Triatoma* nor *Ornithodoros* will play any major role in the transmission of African sleeping sickness, nagana, or surra."

VANDERPLANK F. L. Experiments in Cross-Breeding Tsetse-Flies (*Glossina* Species). Ann. Trop. Med. & Parasit. 1948, Sept., v 42, No 2, 131-52 2 figs. [25 refs.]

The author has carried out a large amount of work on cross-breeding between different species and sub-species of *Glossina*. The paper does not deal with the possible use of this method for controlling *Glossina* in the field (see this Bulletin 1948 v 45 51)

Some practical tests were done in infested cellars. These were sprayed with gamma BHC and observed to note number of dead bugs appearing in subsequent periods. The final numbers alive were assessed after spraying with "Fly Tox", a pyrethrum spray which drives out the hiding bugs. Fairly good results were obtained if about 1 gm gamma BHC was applied per square metre. Better results were obtained with a combined gamma BHC plus pyrethrum spray which secured a good initial kill.

A trial of three gamma BHC smoke generators (56 gm BHC containing 10 per cent gamma) in a 40-cubic metre infested cellar, were disappointing, many triatomas survived.

J R Bursine

LEISHMANIASIS

PACKCHANIAN, A. A. The Fate of *Leishmania donovani* and *Leishmania tropica* in the Reduviid Blood-Sucking Insect, *Triatoma*. *Amer J Trop Med* 1948, July, v 28, No 4, 537-9, 1 fig

"1 The flagellates of *L. donovani* and *L. tropica*, when fed to various species of *Triatoma* with defibrinated rabbit blood from ball of absorbent cotton, failed to multiply in this insect, or to survive for more than a day.

"2 It is concluded that *Triatoma* are not likely to become vectors of cutaneous and visceral leishmaniasis, if and when they feed on men or animals suffering from these diseases."

FAKAÇELLI, N. M. Yeni bir kala-azar vakası hakkında [Infantile Kala Azar] *Türk Tıp Cemiyeti Mecmuası* 1947, Sept, v 13 No 9 [In Turkish 394-7, 4 figs. English summary 56]

A fatal case in a boy of 18 months diagnosed by spleen and marrow puncture

FAKAÇELLI, N. M. Kala-azar hakkında [A Case of Infantile Kala Azar] *Türk Tıp Cemiyeti Mecmuası* 1946, May, v 12, No 5 [In Turkish 160-62. English summary 24-5]

A case in a boy of 3½ in Istanbul

BILHAN, N. Erşkinde kala-azar [5 Cases of Kala Azar of the Grown-Up] *Türk Tıp Cemiyeti Mecmuası* 1945, Dec, v 11, No 12 [In Turkish 517-20. English summary 76]

Leishmaniae were found in either bone marrow or splenic smears. Two patients died. The author suggests that kala azar is increasing in Turkey.

H J O'D Burke-Gaffney

CORKILL, N. L. Activation of Latent Kala-Azar and Malaria by Battle Experience. *Ann Trop Med & Parasit* 1948, Sept, v 42, No 2, 224-9, 1 map & 2 graphs

A military unit ["a company", number unspecified] was recruited in June 1940 in the Nuba Mountain area of the Sudan, where leishmaniasis is very rare, the men therefore were presumably not infected with, but were susceptible to, kala azar. The unit was moved to Southern Fung, an area of high kala azar endemicity, in October, 1940, one man was there hospitalized for an undetermined condition, at post mortem 104 days later he was found to be suffering from kala azar. It is suggested that he acquired his infection in the hospital, local cases of kala azar being concurrently treated there. In

OSIMAKI J. J. Resultados obtenidos con el uso de la fijación del complemento en el diagnóstico de la enfermedad de Chagas. [Complement Fixation in Chagas's Disease.] *Arch. Uruguayos de Med. Ciruj. y Especialidades* 1947 Sept., v. 31 No. 3 123-54. [Bibliography] English summary

For antigen the author used extracts of the spleen of a dog infected with *T. cruzi*. He prepared 21 stocks of "moist antigen" obtained by macerating the spleen in water with one-third glycerin and a small quantity of phenol and 15 stocks of "dry antigen" by triturating ~~in vacuo~~ at low temperatures. [Details of the preparation are not given in this paper. It is stated that methods of preparation and technique of the test are described elsewhere.]

In all 463 sera were tested. 330 from healthy subjects or those suffering from diseases other than Chagas's disease. 100 syphilitics giving a positive Wassermann reaction and 43 with Chagas's disease proved by blood examination or by xenodiagnosis.

Cases of the disease are subdivided into three groups. 1. Those with fever, adenopathy and splenomegaly—the acute initial stage of the infection usually on the 18th or subsequent days. 2. The latent period—a not very definite period between the acute early stage and the later tertiary stage. It corresponds to what has been called the subacute form of the disease. 3. The tertiary period with cardiac changes—the chronic form of the disease.

Of 13 in the first and early second stages, i.e. within a year of onset tested with the moist antigen 12 were positive and of 10 tested with the dry antigen 7 were positive. Seven were tried with both antigens and, with one exception, the results were identical. This one gave a one-plus with the dry and two-plus with the moist antigen. Of 19 of the chronic cases group tested with the moist antigen 10 were positive. Of 23 tested with the dry antigen 13 were positive altogether of 32 different patients 18 or exactly half were positive. Twelve were tested with both antigens and, as with the first group, all but one gave the same results with both—the exception, as in the one in the first group gave a one-plus with the dry and a two-plus with the moist antigen.

In the primary stages the W. R. may be positive without the presence of syphilis but as the acute symptoms subside the W. R. becomes negative.

H. Harold Scott

DIAS E. & PELLEGRINO J. Alguns ensaios com o "Gammexane" no combate aos transmissores da doença de Chagas. [Experiments with Gammexane against Vectors of Chagas's Disease.] *Brasil-Médico* 1948 May 1 8 & 15 v. 62 Nos. 18-19-20 185-91

Experiments were carried out with preparations of gamma BHC to determine the effectiveness of this insecticide for controlling *Triatoma* (*T. infestans*) the carrier of Chagas's disease. Laboratory tests were made with dried mud or wood surfaces, the former being similar to cellars which the triatoma infest. Such surfaces rapidly absorb sprays and it was necessary to employ a preparation of gamma BHC which was deposited superficially. A satisfactory product was found in "Gammexane" P530 which forms aqueous emulsions. Dried mud surfaces treated with 1.2 gm. of gamma BHC per square metre were lethal to adults and nymphs of *T. infestans* after a minute's contact. A surface of mixed mud and straw required rather longer (3-15 minutes' contact).

Adults were more susceptible than nymphs. Test repeated later showed that the toxicity had greatly declined after a month and even more after two months when exposures of several hours did not always kill. Gamma BHC was superior to DDT in these tests.

Many of the recent observers of the typhus fevers have tended to ignore the evidence that can be obtained by a study of the epidemiological conditions associated with outbreaks]

John W D Megaw

RIVOALEN, A Considérations épidémiologiques et biologiques à propos d'une épidémie de typhus au Tonkin (1944) [Epidemiological and Biological Considerations connected with an Epidemic of Typhus Fever at Tonking (1944)] *Bull Soc Path Exot* 1948, v 41, Nos 5/6, 329-33

Two exceptionally large epidemics of typhus fever in Indo-China are described. Between August 1943, and March 1944, there were 352 cases in South Annam, the mortality rate was 17.6 per cent. Between February and June 1944, 726 cases were admitted to a hospital in Tonking, it was estimated that between four and five thousand cases occurred in Hanoi and its suburbs, and tens of thousands in the delta.

Rickettsiae isolated in the South Annam epidemic caused a slight scrotal reaction in three out of fifty inoculated guinea-pigs.

The mortality rate in the Tonking hospital was 16.6 per cent in February, but it gradually fell and was only 6.9 per cent in June. Scrotal reactions are said to have occurred rather frequently ("*assez fréquemment*") among the guinea-pigs inoculated at the Hanoi Pasteur Institute.

Detailed laboratory studies were impossible at the time, but three years later the serum of a former patient (the author himself) was found by Giroud to have more active antibodies against epidemic than against murine typhus when tested by the rabbit dermal reaction.

In the discussion following the reading of the paper, GIROUD reiterated his opinion that it is difficult to differentiate epidemic typhus from murine typhus by animal inoculation, he mentioned his own experience of finding that epidemic rickettsiae sometimes caused scrotal reactions and that murine rickettsiae might, or might not, be fatal to mice.

[There seems to be little doubt that the epidemics were of louse-borne typhus. The author considers the fatality rate to have been lower than would have been expected in epidemic typhus, especially as only the more severe cases were likely to have been sent to hospital, but the louse-borne disease tends to be less virulent in hot climates, where for some reason transmission of infection does not readily occur.]

John W D Megaw

EVANS, A S Observations on Typhus in Okayama, Japan. *Bull U S Army Med Dept* 1948, Sept, v 8, No 9, 733-41, 2 figs [22 refs]

Between February and July 1946, 184 cases of typhus fever were reported in Okayama Prefecture. The outbreak was part of a widespread epidemic of louse-borne typhus in Japan and Korea during "the latter part of 1945 and extending through the first six months of 1946". It was estimated that 30,000 cases had occurred and that the case fatality rate had been 6-10 per cent in the epidemic as a whole.

Murine typhus is believed to be endemic in Okayama, and the local physicians classed 56 of the 184 cases as murine on clinical and epidemiological evidence which the author regards as quite unreliable. The information obtained in connexion with the louse-borne cases points to a close resemblance between the disease and the epidemics occurring in other parts of the world.

John W D Megaw

May 1941 the men were engaged in battle under arduous climatic conditions. Immediately afterwards cases of fever due to kala azar were found among them—their appearance bore no relation to the local seasonal peak of incidence of the disease. The unit, in November 1941 was again engaged in battle in the same place under similar conditions, and further cases of fever due to kala azar followed. The appearance of all recorded cases is depicted diagrammatically—it would appear that the total number was 24.

The onset of relapses, or of delayed primary attacks, of malaria in European troops as a result of battle experience suggested itself as a comparable phenomenon. A study of hospital records of such cases in 1944 supported this view and in a graph is recorded the incidence of such attacks of malaria in British troops following the invasion of Europe. The peak of incidence among these considerably antedated that of the normal seasonal relapse wave which, in them, when it occurred was consequently largely abortive. It is suggested that the activation of both the kala azar and the malaria infections was due to increased adrenaline secretion resultant on emotional stress.

A. R. D. ADAM

CORKILL, V. L. Activation of Latent Kala Azar by Malaria and Relapsing Fever. *Ann Trop Med & Parasit.* 1945 Sept. v 42, No. 2, 230-35
1 graph.

The peaks of admission to hospital of kala azar and of malaria in the Sudan, as in India and elsewhere, tend to be associated. These normally occur in the Sudan in the latter part of the year. In 1940 at Gedaref in the Sudan an abnormal rise in the incidence of detected cases of kala azar occurred in the spring. This was found to be associated with an outbreak of relapsing fever. The rise in incidence usually taking place in the latter part of the year was largely abortive on this occasion. Data showing the reported incidence of cases of malaria, of kala azar and of relapsing fever and their association are set forth in graphs.

A. R. D. ADAM

FEVERS OF THE TYPHUS GROUP

JADIN, J. Le typhus exanthématique de l'Urundi. [The Exanthematic Typhus Fever of Urundi.] *A. n. Soc. Belge de Méd Trop.* 1945 June 30 v 28 No. 2, 189-211, 2 charts & 1 map.

The author and P. GIBERT have already reported that in the 1945-1946 epidemic of typhus fever in Urundi the rickettsia-agglutination reaction was of the epidemic type [see this *Bulletin* 1945 v 45 582]. In the present paper a detailed study of strains of rickettsiae isolated from patients during the epidemic is described. A pericrathic reaction occasionally severe was often caused in guinea-pigs, but the results of complement fixation and rickettsia-agglutination tests carried out on patients and inoculated animals pointed definitely to *Rickettsia prowazekii* as the cause of the epidemic. Lighter samples of serum from patients were sent to the late Harry Plotz who reported that 13 of them gave complement-fixation reactions typical of epidemic typhus.

These findings disagree with those of NEUFJAN who maintained that the previous epidemics in the same region in 1893-34 and 1899-40 were caused by murine rickettsiae [*Ibid* 1946, v 43 324].

The scanty information supplied with regard to the epidemiological and clinical features of the epidemics points rather strongly to house-borne infection.

Lanchow, China High, or moderately high, titres were reached with both tests in 72.7 per cent of the cases such titres were reached with the Weil-Felix test alone in 9.1 per cent and with the complement-fixation alone in 18.2 per cent of the cases. The time of appearance of the antibodies was variable, sometimes one of the tests became positive first, sometimes the other. In some cases the earliest positive result with either test was delayed till the 12th or even the 14th day.

Among bacteriologically proved cases of enteric fever in Peiping, the Weil-Felix test became strongly positive in two, and a mixed infection was suspected, a rise of the titre to 1-80 or 1-160 was observed in 10 other cases.

Among 67 cases of fevers other than typhus, 10 showed a rise in titre with the Weil-Felix or complement-fixation test, in two of these both reactions became strongly positive and a dual infection was suspected, in one the Weil-Felix reaction was positive 1-80, and there was no rise in the complement fixation titre, in the remaining seven cases the fixation titre rose to 1-8 to 1-64 and there was no rise in the Weil-Felix titre.

The authors suggest that "a small rise in titre of either antibody itself does not constitute a diagnostic criterion" but should be evaluated in correlation with the clinical evidence.

John W D Megaw

D'ICNAZIO, C & CODIFLEONCINI, E La reazione di Weigl nella diagnosi precoce e precocissima del tifo esantematico [The Weigl Reaction in the Early and Earliest Diagnosis of Typhus Exanthematicus] *Acta Med Italica* 1948, Aug, v 3, No 8, 208-12, 1 chart English summary (7 lines)

The authors claim to be able to make a very early diagnosis of typhus fever by employing Weigl's micro agglutination reaction in which suspensions of *Rickettsia prowazekii* are used. The special features of their technique are the employment of very low dilutions and the repetition of the test every four hours. The series of dilutions starts at 1-3 and rises by slow degrees to 1-6, 1-9, 1-12, etc.

Among 13 patients tested on the first day there were already five positive reactions at a titre of 1-3, among 27 tested on the second day there were 18 positives, including one at a titre of 1-18, five at 1-12, and seven at 1-9.

The reaction is said to become positive one to one and a half days earlier than the Weil-Felix test, but in the latter the lowest dilution employed was 1-20 so that the conditions were not comparable. The special interest of the study is that it suggests the possibility of detecting the earliest rise in the agglutination titres by repeated tests with low dilutions of the sera.

John W D Megaw

BALTAZARD, M & BAHMANIAR, M Presence du virus du typhus murin chez les rats des ports d'Abadan et Bender-Bouchir (Golfe Persique) [Murine-Typhus Infection among the Rats of the Ports of Abadan and Bander-Bouchir (Persian Gulf)] *Bull Soc Path Exot* 1948, v 41, Nos 5/6, 174-5

At Abadan in South Iran the authors trapped 49 rats of which 19 were *Rattus norvegicus*, 13 were *R. alexandrinus*, and 17 were *R. frugivorus*. An orchitic strain of rickettsia was isolated from a pool of three *R. norvegicus*, and another strain from a pool of three *R. alexandrinus*.

At Bouchir 66 *R. frugivorus* and 6 *R. norvegicus* were caught. *R. alexandrinus* was absent. An orchitic strain was isolated from a pool of four *R. norvegicus*. No infection was found among rats of the species *R. frugivorus*, the indigenous

PÉREZ GALLARDO F & FOX, J P Infection and Immunization of Laboratory Animals with *Rickettsia prowazekii* of Reduced Pathogenicity Strain E. *Am J Hyg* 1948 July v 48, No. 1 6-21 [29 refs.]

This is a study of strain E (E for *Espana*) of *Rickettsia prowazekii* isolated in Madrid in 1941 by CLAVERO and GALLARDO and found to be of persistently low virulence to man and animals while being of good potency as an immunizing agent (see this *Bulletin* 1944 v 41 24 and 1945 v 42 794)

The strain has now been maintained through 255 egg passages and taken to New York for the further studies described in the present paper

The strain has been found less pathogenic than other epidemic strains for mice eastern cotton rats rabbits and guinea-pigs it could not be established in guinea-pigs but has been maintained without any change in pathogenicity through 11 passages in cotton rats It has also been passaged once or twice through lice.

The immunity caused in animals by inoculation with the strain was weaker than that caused by other strains of *R. prowazekii* but was enough to protect cotton rats and guinea-pigs against relatively large challenge doses of virulent epidemic and murine rickettsiae.

Sera of infected guinea-pigs fixed complement at titres lower than those observed after infection with other strains, and it was found that the titre of the reaction varied according to the size of the infecting dose of rickettsiae, whereas a variation of this kind is not observed with virulent strains.

The value of the strain as a living vaccine for human beings remains to be tested but trials are regarded as justified in view of the existence of a potent therapeutic agent para-aminobenzoic acid.

John W D McGraw

GIROUD P & JEJERSKI A. Pouvoir toxique des rickettsies du typhus épidémique ou rennin provenant de passages pulmonaires. Différenciation des souches. (The Potency of the Toxins of Epidemic and Murine Typhus *Rickettsiae* obtained by Passage through Lungs. Differentiation of Strains.) *Bull Soc Path Exot* 1949 v 41 Nos. 5/6, 336-8.

The experiments described were devised with a view to finding whether the toxicity of epidemic typhus rickettsiae would be modified by repeated passages through lungs.

Comparison was made between epidemic rickettsiae which had been maintained by rabbit-lung passage for six years and a strain of murine rickettsiae of which no details are given except that it was of pulmonary origin.

Injections of rickettsial suspensions were given by the intraperitoneal, intravenous and intracerebral routes to white mice of which 250 were used. The intravenous route was found most suitable for estimating the toxicity of the strains but by all three routes the epidemic strain was less toxic than the murine. By the cerebral route the murine strain caused paralysis in mice whereas the epidemic strain caused no manifestations of this kind.

John W D McGraw

LEE Wen-wing, CHANG, Hwei-ching & WANG Pei-chen. Frequency Concentration and Behavior of *Proteus vulgaris* O/19 Agglutinin and Complement Fixing Antibody for *Rickettsia prowazekii* in Typhus and Non-Typhus Febrile Patients and in Normal and Vaccinated Persons. *Chinese Med J Shanghai* 1949, Apr v 68 No 4 177-81 [23 refs.]

This paper contains an account of a detailed study of the Weil-Felix and complement fixation reactions observed in 33 cases of house-borne typhus in

sputum of German soldiers. One of these strains was maintained through 20 guineapig passages over a period of 15 months, and was identified early in 1945 in America as *Rickettsia burneti* by DINGLE to whom the strain was submitted.

In the further studies described in the present paper, complement-fixation tests revealed the occurrence of inapparent infection among physicians and other persons who had come into close contact with patients, and also the occurrence of infection among goats in Greece and Asia Minor.

Kids and lambs were experimentally infected by nasal instillation or subcutaneous inoculation of infected blood, after an incubation period of 6-10 days there was a febrile attack lasting 7-12 days, and the blood of the animals was found infective during the whole febrile period.

Horses and mules were found to be highly susceptible to subcutaneous inoculation, dogs were somewhat susceptible, but cats were resistant.

Goats and sheep, inoculated by the nasal route with the blood of infected guineapigs, developed severe attacks in which bronchopneumonia was a pronounced feature. The milk of infected goats remained infective throughout the rest of the period of lactation and samples kept in the refrigerator remained virulent for at least three months.

In Athens the milk of a flock of 16 Maltese goats was examined in pools, and it was found that at least four of the animals were infected. Other flocks of goats yielded similar results.

Nine new-born kids and five new-born lambs of infected mothers were found free from infection at birth, but 8-10 days later they had febrile attacks and *R. burneti* was isolated from their blood. The above observations are regarded as showing that milk is the source of natural infection among animals and that it "must be also the source of human infection". The author states that although transmission in man can occur by the inhalation of particles of sputum, this does not appear to be the chief natural mode of spread of infection, because the seasonal arrest of the disease in summer is correlated with the cessation of lactation among goats and sheep.

The author seems to suggest that the mechanism of transmission by milk is through direct contact of the milk with the upper air passages, he states that this mechanism would help to explain the special involvement of the respiratory system in man and lower animals.

[In their study of 117 cases of the disease in Southern California HUEBNER *et al* found no evidence that infection was transmitted to man by drinking milk, though they thought it possible that milk might be a source of infection by some mode not yet determined (see this *Bulletin*, 1948, v 45, 509).]

John W D Megaw

CAMINOPETROS, J. Le lait source de contamination de l'homme et des animaux dans la transmission de la fièvre du Queensland observée en Grèce [Milk, the Source of Q Fever Infection of Man and Animals in Greece] *Bull Acad Nat Méd* 1948, v 132, Nos 25/26 468-71

This is an abbreviated version of the paper dealt with above

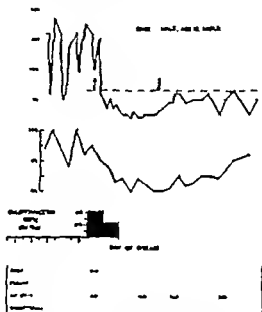
IMHAUSER, K. Untersuchungen über den Erreger der "Viruspneumonie" [On the Aetiology of "Viruspneumonia"] *Klin Woch* 1948, June 1, v 26, Nos 21/22, 337-9 [15 refs]

The paper recounts experiments on guineapigs and rabbits inoculated with sputum from cases of epidemic bronchopneumonia seen in Greece and South-East Europe in 1941 and 1944.

The treatment was started on the 3rd to the 11th day of the fever (average 6.2 days). The duration of the fever after treatment was started was 10 to 94 hours (average 31 hours). The treated patients were discharged from hospital 9 to 28 days (average 19.5) after the onset of the illness the control patients were discharged 17 to 53 days after the onset (average 30.7 days).

There was no death and no complication among the treated, one of the control patients died and two had complications, parotitis and pneumonia, respectively.

The remarkable response usually shown to the drug is shown by the chart of a typical case.



Typical response of patient with scrub typhus
Following treatment with chloramphenicol
[Reproduced from *Science*]

In the earlier cases the treatment was on the lines recommended in the previous paper but the course was gradually shortened and the last seven patients received the drug for only 24 hours during which time a total quantity of about 6.0 gm. was given.

John B. D. Segaw

SLUT, G. A. Para-aminobenzoëzuur in de behandeling van scrubtyfus (Miltkroet). [Para-aminobenzoic Acid in the Treatment of Scrub Typhus.] *St. J. Medisch* 1943 Aug 1; 23: 509-11.

A discussion and account of case

CAMINOPETROS J. P. La "Q" Fever en Grèce. Le lait source de l'infection pour l'homme et les animaux. [Q Fever in Greece. Milk as a Source of Infection for Man and Animals.] *A n. P. asiat. Humaine et Comparée* 1948 v. 23 No. 1/2, 107-18.

The author has made a close study of the disease since 1943 when he first isolated rickettsiae from the blood and putum of patients in Greece by guinea-pig inoculation. Seven strains were isolated from the blood and five from the

PLAGUE

DAVIS, D H S Sylvatic Plague in South Africa History of Plague in Man, 1919-43 *Ann Trop Med & Parasit* 1948, Sept, v 42, No 2, 207-17, 5 figs & 1 diagram

This paper is the first part of a study of human plague of sylvatic origin in the Union of South Africa. It describes the spread of the disease from 1919 to 1943, the next paper will deal with the ecological factors concerned in the spread. Until 1912, plague was of domestic rodent origin and occurred solely in towns. Then followed a series of outbreaks on remote farms in the Cape Midlands which were proved to be of sylvatic origin. Farm workers were the chief sufferers, they contract the disease in huts and outbuildings where the domestic rodents have become secondarily infected from the gerbils. The gerbils (*Ialaca brantsii* and *schinzii* in the high veld and *Desmodillus auricularis* in the karoo) form the chief primary reservoir, these animals infect the semi domestic *Mastomys natalensis*, which infects in its turn either man directly or man via the intermediary of the domestic *Rattus*. If the chain of infection reached urban areas, serious epidemics might be expected but curiously enough have rarely actually occurred. Instead, there have been over 900 outbreaks in rural areas which have usually been the pointer to the existence of preceding epizootics amongst the wild rodents. There were two major epidemic periods, (1) between 1923 and 1925 and (2) between 1934 and 1936, with the incidence rising to smaller peaks every 5-6 years. The initial foci were in the North Western Orange Free State, in the Cape Midlands in the Southern Transvaal (near Johannesburg) and in the Uitenhage District. Between 1925 and 1931 there was a westerly expansion throughout the karoo and the Kalahari Desert which carried the infection into South-West Africa and Bechuanaland. During the next six years (up to 1937) epidemics occurred throughout the Orange Free State and infection spread into Angola, Basutoland and into the Rhodesias. As far as the Union was concerned, enzootic plague had reached its limits by 1937, and the situation has remained static except for three hyperenzootic areas—Northern Orange Free State, a small focus in the Cape Midlands and in Uitenhage. Sylvatic plague flourishes today among the burrowing rodents of the rolling semi-desert country, it is absent in North Eastern Transvaal, Natal and the coastal and low-lying parts of the Cape Province.

P C C Garnham

BUXTON, P A Experiments with Mice and Fleas I The Baby Mouse *Parasitology* 1948, July, v 39, Nos 1/2, 119-24, 2 figs

During investigations into the feeding habits of the flea *Xenopsylla cheopis*, it was frequently observed that adult mice, when used as hosts in laboratory experiments and in stock cultures, ate a number of the fleas. When baby mice were used, however, it was found that the fleas were not eaten. A study was therefore undertaken of the baby mouse as a host of *X. cheopis*, and in this paper the author gives an account of experiments which he made between 1937 and 1939.

The experimental technique is fully described and the resulting data are tabulated and graphed. At the beginning of each experiment, all fleas were unfed and under 24 hours old, and as the baby mice could not be fed they were changed every 24 hours.

Preliminary work showed that the fleas fed equally well on very young mice and on those 10 days old, and gave no support to the idea that a baby mouse might be a bad host because it was cold. It was also noted that when fed on

adult mice kept at 30°C fleas started to lay eggs after a delay of 1 day and though the daily production of eggs was unknown, the adult offspring per female per day was about seven.

Among fleas kept at a constant temperature and humidity (22° or 30°C. and 80 per cent. R.H.) for as long as 14 days, on baby mice of various ages up to 9 or 10 days old, there was almost no mortality but egg-laying started later (as much as 3 or 4 day) egg production was lower and adult progeny emerged later than was the case among fleas kept on an adult mouse under similar conditions. When fleas were allowed one initial feed on an adult mouse before being transferred to baby mice they continued for at least 18 days to lay more eggs than fleas which had fed only on baby mice.

Experiments at higher temperatures (32° and 34°C.) showed that parent fleas survived better on the baby than on the adult mouse and the adult mouse consistently killed more fleas. The number of progeny was lower and the individual fleas were smaller. At 34°C. there was no progeny either of adults or cocoons.

It is obvious that fleas fed on baby mice alone lack something, and this deficiency is greater the younger the mouse. The deficiency is apparently not in nutrition but more probably due to lack of a mammalian sex hormone. This point will be investigated.

H. S. LEROU

SILARIF M. The Water Relations of the Larva of *Xenopsylla cheopis* (Siphonaptera). *Parasitology* 1949 July & 39 Vol. 1/2, 148-55. [19 refs.]

The experiments described in this paper were designed in an attempt to discover how water is gained by the growing flea larva.

A quantitative study was made of the development of the larvae of *Xenopsylla cheopis* and statistical methods were applied to the experimental data to ascertain if certain aspects of biology varied when the larvae were reared under different conditions of moisture content both of food and of air. The criteria adopted were: the duration of the active larval life and of the combined larval and pupal life of both sexes; the mortality rate in different active larval instars and the period in which they died; the proportion of resting larvae that failed to pupate and the proportion of success in the rearing of adults and the disparity in their sex ratio.

At the commencement of each experiment the larvae were unfed and less than twenty-four hours old. They were put into small specimen tubes and kept at a constant temperature of 22°C. which is suitable for successful development and at a relative humidity of 60 per cent. which is low enough to magnify any differences under experimental conditions. The larval food was a mixture of blood and yeast which had been dried over concentrated sulphuric acid for three to five days or for fifteen days before being used. In some experiments the quantity of food was sufficient to cover the larvae (7 gm.) making a layer 3/16 in. deep. In these tubes larvae burrowed through the food to the bottom even though condition there was less favourable than on the surface. In other tubes the amount of food was not enough to cover the larvae even if they tried to burrow. Some experiments were run in which the food, both shallow and deep, was unchanged, and in others the food was changed either once or twice a day. Control experiments were made with deep food mixed with sand which had previously been brought into equilibrium by exposure to 60 per cent. relative humidity at 22°C. The course of each experiment is described in detail and the results are summarized in two columns (Tables). These show that in the control experiment 100 per cent. of the larvae completed their active larval life, 94.5 per cent. per individual cocoon and 95 per cent. of them emerged successfully. The proportion of the emerged adults

was significantly higher and their average combined larval and pupal life was significantly shorter than when they were reared in a large quantity of unchanged dry food, or in a small quantity of dry food whether changed or not. All the larvae died in the first instar, within seventeen days, when kept in a large quantity of dry food changed once or twice a day.

It is thus proved by controlling the quantity of dry food and its moisture content and the duration of its exposure to 60 per cent relative humidity at 22°C, that the chief source of the gain of water in the larva of *X. cheopis* is through its food.

H S Leeson

INDIAN MED GAZ 1948, Mar, v' 83, No 3, 137-43 [30 refs] Plague
in Calcutta

This editorial article, by Lt-Col GREVAL, I M S (ret) is a suitable introduction to the following six papers dealing with the reappearance of plague in Calcutta which had remained free from indigenous cases of the disease since 1926.

The article will be of special interest to historians of plague in India. Several extracts are given from editorial articles in the *Gazette* during the early years of the original invasion of Calcutta and Bombay by the disease from 1895 onwards, these articles were by Dr W J SIMPSON who wrote with special authority because he was also Health Officer of Calcutta at the time. The yearly incidence of the disease in the two cities up to 1925 is also given.

There is a brief reference to the dramatic murder committed on the crowded platform of the chief railway terminus of Calcutta in 1933. This was by the injection, presumably by a hypodermic syringe, of a culture of plague bacilli into the victim who was the half-brother of the originator of the crime. The culture had been obtained from a bacteriological laboratory in Bombay by a medical man who posed as a research worker interested in testing the efficacy of a treatment of the disease and who was duly sentenced to death at the same time as the chief conspirator. For some reason the sentences were commuted to long terms of imprisonment, but the wicked half-brother after his release met a violent death during the civil disturbances of 1947.

The present outbreak is described as having lasted from March 6 to May 25, 1948 and as consisting of not more than 147 cases with 30 deaths, but a final note dated June 28 contains the information that no further cases have been reported since June 2nd 1948.

The antedating of the present issue of the *Gazette* by at least three months is likely to puzzle readers who find that events of April, May, and June are described in articles whose date of publication is stated as being March of the same year.

John W D Megaw

LAL, R B & SEAL, S C An Interim Note on certain Features of the Outbreak of Plague in Calcutta during March-May 1948 (corrected up to 10th May)
Indian Med Gaz 1948, Mar, v 83, No 3, 145-8

The authors describe an epidemiological study carried out between April 17 and May 10 1948, into the outbreak of plague in Calcutta.

Eleven cases, of which eight were fatal, had already occurred, but none had been recognized as plague till the commencement of the enquiry. From April 29 the number of cases rapidly increased so that during the next two weeks 105 had been reported, and by May 10 the total number of confirmed

case was 147. The case-fatality rate was 11.5 per cent, most of the life cases having been very mild. There were 84 other cases in which plague was suspected but excluded. Only three of the 33 wards and suburban areas of the city remained free from the disease, but the number of cases exceeded 10 in only five of these areas. Surprisingly, 134 of the cases occurred singly, three houses had two cases each, one house had three cases, and one had four.

The wide and rapid spread of infection is shown by the fact that between the 16th and 31st April first cases were reported from 77 of the 95 areas mentioned above.

Bacteriological examination of 891 rats trapped in 23 areas, was carried out between April 20 and May 10. Five strains of infection were isolated from 19 rats, of which seven were *Rattus rattus* and 12 were *R. norvegicus*. The heaviest rate of infection of rats was in the ward of the city in which the first case and the largest number of cases occurred, but one or more infected rats were trapped in 10 other areas. Infection doubtless existed in many other areas because in only nine of the 33 areas did the number of rats trapped exceed 20, so that the survey was admittedly inadequate.

The flea and *Y. cheopis* indexes, based on the examination of a limited number of rats, were as follows—

	Flea index	<i>Y. cheopis</i> index
April 19	2.5	2.5
4	11.5	4.0
29	8.7	2.9
May 10	Between 1.0 and 1.5	

The authors hesitate to express an opinion as to whether the outbreak heralds the beginning of a pandemic, but they find some indications that it may do so and they rightly insist that the situation ought to be handled on the assumption that the history of the previous visitation may repeat itself. They point out that Dr Simpson, Health Officer of Calcutta, diagnosed a case of plague in 1895 and that his warning of the danger was ignored.

John W. D. Meyer

ROY, D. N. A Note on Fleas and Rats with reference to Plague in Calcutta. *Indian Med Gaz.* 1948 Mar v 83 No. 3 149-50.

A concise description is given of the bionomics of rats and fleas in India, with special reference to the transmission of plague.

Mention is made of two previous surveys of the incidence of rat flea in Calcutta. The first was by STRICKLAND and the author in 1930 [this Bulletin 1930 v 27 731] when a low flea index was observed, the second was by RAO in 1941 (*ibid.* 1941 33, 622) when the index was 9.0 for *Rattus norvegicus* and 4.3 for *R. rattus*.

John W. D. Meyer

PANJA, G. & GUPTA, S. K. A Note on the Investigation of Suspected Plague Cases in the Campbell Hospital, Calcutta. *Indian Med Gaz.* 1948 Mar v 83, No. 3 148-9.

From April 16 onwards 77 cases were investigated by the authors at the Campbell Hospital. *Pasteurella pestis* was isolated from eight of the patients.

by gland puncture, but only one yielded a positive blood culture. All of the successful isolations were effected during the first few days of the investigation when only severe attacks were occurring.

Slide agglutination tests are said to have been very useful in identifying cultures of the organism and in the serological examination of the patients.

Sera of all the bacteriologically-positive patients who survived long enough contained agglutinins (titres 1-20 to 1-320) against recently isolated strains of *P. pestis* by the 7th to the 10th day of the illness. There was a positive reaction in only three of the bacteriologically-negative cases. Freshly prepared suspensions of 24-hour agar cultures were employed, and the reading of the slide test was made after one minute.

The large number of negative results is attributed to the mildness of the attacks and the use of sulphonamide drugs.

John W D Megaw

GUPTA, A K D A Short Note on Plague Cases treated in Campbell Hospital
Indian Med Gaz 1948, Mar, v 83, No 3, 150-51

Most of the patients attacked during the epidemic in Calcutta were treated at the Campbell Hospital where 129 [since corrected to 132] were dealt with up to May 25, 1948.

Between May 7 and May 25 severe cases predominated, and for the whole epidemic the bacteriologically positive cases numbered 21, all of these were positive with gland puncture and 13 were positive also with blood culture. Fourteen cases were classed as septicaemic, the rest as bubonic.

Three different lines of treatment were adopted (1) streptomycin injections, 24 of the severest cases were treated and there were seven deaths [since corrected to 4] (2) sulphadiazine by mouth, and (3) sulphamethazine, an initial dose intravenously, then four tablets every four hours. Among the 108 cases treated by sulphonamide drugs there were 11 deaths, but in the conditions prevailing it was not possible to express an opinion regarding the relative value of the different lines of treatment.

John W D Megaw

AHMAD, M U Recent Outbreak of Plague in Calcutta *Indian Med Gaz* 1948, Mar, v 83, No 3, 156

This is a brief note by the Health Officer of Calcutta who states that the control measures adopted were the isolation and treatment of patients in hospital, disinfection with DDT, epidemiological investigation and examination of rats under the supervision of the All-India Institute of Hygiene and Public Health, and mass inoculation.

PATEL, T B & REBELLO, J L An Assessment of the Value of Plague Vaccine (Haffkine Institute) as used in a Single Dose Mass Inoculation (A Field Enquiry) *Indian Med Gaz* 1948, Mar, v 83, No 3, 151-5

An attempt was made to assess the value of single doses of plague vaccine (2.0 cc) recently obtained from the Haffkine Institute, Bombay.

The enquiry was made after the subsidence of the epidemic, it dealt with 3,320 infected houses in 120 villages and seven municipalities. Despite the limitations of an enquiry held without previous planning the authors consider that certain broad conclusions can safely be drawn from their findings. The information collected has been analysed from several points of view, but the

Interaction of anti filtrate sera and filtrate—This was tested by mixing a 1 in 5 dilution of the serum with an equal part of the filtrate. After keeping the mixture for one hour in the waterbath at 37°C. and then two hours in the refrigerator the resulting precipitate was centrifuged off and the supernatant fluid titrated by the same method. The filtrates inactivated, to a considerable extent the neutralizing antibodies and the agglutinin against "O" suspensions the neutralization of "O" antibodies was however not complete and the titre of the serum against "OH" suspensions was only slightly lowered. Filtrates which had been rendered inactive by heating or by addition of formaldehyde lost their power of neutralizing the antibodies in the sera. The agglutinating titre against "O" suspensions however was lower in all sera, although the serum treated with boiled filtrate showed only a slight lowering of agglutinating power.

Both "O" agglutinating and protective antibodies on the other hand, were removed from the anti-filtrate sera by absorption with "O" suspensions. The significance of these differences is discussed—a possibility is that the "O" antigen in the solution in the filtrate may be more labile rather than qualitatively different from that of "O" suspensions but "the fact that suspensions of *V. cholerae* and autolysates of vibrios are free from F.F., however is very suggestive of some essential difference between F.F. and the somatic antigen of the vibrio." The difference cannot be defined on the available evidence.

Results similar to those with the Ogawa strain used were obtained with Inaba and Hikojima forms.

In a "discussion" the authors comment on the nature of the soluble substance obtained from cultures of *V. cholerae* that produces in the guinea-pig ileum, to a certain extent the pathological changes found in human cases of cholera. They consider that the production of F.F. may be connected with the virulence of strains, and that its action could explain most of the symptoms of cholera.

Reference is made to BURKET'S finding that F.F. is a mucin-splitting enzyme. Its possible status as a toxin is discussed. The discovery of F.F. will not alter the accepted methods of cholera vaccination at present—the antibodies produced by the somatic antigen in cholera vaccines protect guinea-pig ileum against the effect of cholera mucinase.

J. Taylor

ANUJA, M. L. & GURKIPAL SINGH. Observations on Cholera Vaccine. *Indian J. Med. Res.* 1948 Jan. v 36 No 1 3-14

The response of human volunteers to inoculation with vaccines prepared from different forms of *V. cholerae* was studied by estimation of rise in bactericidal titre of their sera and the value of the sera for passive protection of guinea-pigs. Groups of six persons received a single dose of 1 cc. of a vaccine (800 million vibrios per cc.) consisting of a suspension 1 agar culture killed by 0.5 per cent. phenol. Three types were used, viz. pure Inaba form, pure Ogawa form and mixed Inaba and Ogawa in equal parts.

Bactericidal titre—Prior to inoculation, natural bacteriolytic for *V. cholerae* were found to be present in the sera at a maximum titre of 1 in 135 in seven, 1 in 45 in three and 1 in 15 or less in eight of the subjects. Ten days after inoculation of each group of 6 persons with one or other of the three types of vaccine bactericidal tests were carried out against both Inaba and Ogawa form suspensions, with different strains from those employed for the preparation of the vaccines. The dilutions used were from 1 in 15 to 1 in 300 (10). The sera of all subjects showed a rise in bactericidal titre the range being from 1 in 40 to 1 in 100 (10).

Bacteriolytic against both the homologous and heterologous forms were found to have been developed by inoculation with either of the pure-form

vaccines and with the mixed vaccine. In the majority of the subjects the bactericidal titre was higher against the homologous form than against the heterologous form, but in a number of the sera the titre for both strains was the same. With the strains used for the preparation of the vaccines, higher titres were obtained with pure Inaba vaccine than with the pure Ogawa or mixed vaccines. The response to inoculation was specific, no bactericidal action being shown against *Salmonella typhi*, *Bacterium coli* and three non-cholera vibrio strains.

A table in the text shows the level of agglutinin titre produced. In one case only the titre reached 1 in 125/250, but in the rest it varied from *nil* to 1 in 50/125.

The rate of development of bactericidal power was studied in three subjects inoculated with pure Inaba form vaccine. A gradual rise of titre was observed, which began on the 3rd day after inoculation, a considerable increase being shown by the 5th day and a maximum level being reached by the 8th day. By the 30th day, a considerable fall in titre occurred and the decline continued in the six months period of observation. The authors conclude that—"it can be assumed that up to the 3rd day there is practically no immunity, between the 3rd and 5th days there is partial immunity and after the 5th day there is considerable immunity", and also that—"for practical purposes the adoption of a six-day period for quarantine regulations is probably suitable although it appears that a high [higher?] degree of immunity would be obtained in 8 to 10 days."

The bactericidal response obtained on re-inoculation 6 months after the primary dose was found to be poor. In no case did it reach the level obtained by the primary stimulus and in some subjects no rise at all was shown.

Passive protection tests—These were carried out in guineapigs by intravenous injection of doses of sera of known bactericidal titre from inoculated subjects, in a range from 0.0001 cc. to 1 cc., followed four hours later by intraperitoneal injection of a mucinized suspension of a six-hour culture of *V. cholerae*. The results show the correlation between the passive protective value of the sera and their vibriocidal titre. A dose of 0.01 cc. of serum with a bactericidal titre of 1 in 100,000 protected guineapigs against the intraperitoneal test infection with a homologous vibrio strain, while no protection was obtained with 100 times that dose of the serum of a non-inoculated subject.

In similar tests with sera of subjects inoculated with pure Inaba or Ogawa form or mixed vaccine, and challenged by both, the sera of those inoculated with the mixed-type vaccine were found to have passive protective substances in a greater concentration than sera of those immunized with a pure Inaba or pure Ogawa vaccine.

Active immunization of guineapigs—No significant difference was found in the results of immunization of guineapigs with either the pure type or mixed vaccines, when challenging doses of both the Inaba and the Ogawa form were used. "An Inaba strain vaccine affords just as good protection against Inaba infection as against Ogawa infection and vice versa."

[One level only of challenging dose appears to have been employed, and no indication is given of the number of lethal doses contained.]

The authors do not consider that the active immunization of mice or guineapigs is suitable as the sole criterion for determining the relative merits of strains for use in the preparation of cholera vaccine, and prefer the passive protection test as being more sensitive. They find the development of agglutinins after cholera vaccination to be at too low a level for assessing the degree of immunity produced. "The infection-resisting capacity of protective substances present in the sera of vaccinated subjects is higher for homologous than for heterologous sub-type infection."

J Taylor

SEAL, S. C. On the Control and Prevention of Endemic Cholera in the Rural Areas of Bengal. *J India Med Ass* 1948, July v 17 No. 10 319-71

Suggestions are made for (a) short term or temporary measures and for (b) long term or permanent measures for the control and prevention of cholera in rural Bengal.

The short term measures recommended are (1) early notification by the village authority (2) visit by a health officer with suitable supplies for disinfection and treatment (3) treatment of the cholera case with sulphaguanidine and oral administration of *slab* water or sodium-bicarbonate-glucose solution (intravenous saline only in advanced cases) (4) prophylactic administration of acid mixture (3 parts acid sulphuric aromatic and 1 part *spt* chloroform, in water) to all contacts, and sulphaguanidine to contacts showing suspicious symptoms (5) isolation and hospitalization of cases in temporary *shed* or mobile camps (6) anti-cholera inoculation. (The author has considered it advisable to a *old* inoculation of the members of an affected family for at least three days as there may be a risk that the measure would be discredited if members inoculated during the incubation period develop cholera.)

Long term measures.—The author considers that "Investigation into the local circumstances and factors which operate in causing repeated outbreaks is a pre-requisite for planning effective preventive measures." For the purpose it is suggested that a "special Epidemic Control Unit" should be formed to take care of the infectious diseases of a sub-division with an average population of 800,000 at an annual cost of about $\frac{1}{2}$ anna *per r* *pat*. While carrying out control work, the Unit would keep continuous records of communicable disease in its area which might be used for forecasting epidemics so that early measures could be adopted to abort them.

The provision of a Segregation Cottage in each village is advocated so that early cases may be isolated. The author does not consider general yearly reinoculation to be feasible but for the prevention of importation of infection believes that cholera could be greatly reduced by insistence on inoculation 7 days before departure to attend a *wida* or a religious congregation and on yearly reinoculation for those regularly visiting trading centres or industrial areas. For reinoculation the author prefers the intradermal administration of 0.1 cc. of the vaccine.

The importance of *mela*s and pilgrimages in the dissemination of infectious disease is recognized by the recommendation for the provision of permanent sanitary arrangements at major perennial centres and for special measures at smaller *mela*s and festivals of short duration.

The necessity for health teaching in school and community life is stressed. [The measures of more permanent nature which are essential for the reduction of the risk of cholera in the endemic areas are not dealt with in this paper, namely provision of protected water supplies and improvement in environmental sanitation.]

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

HANSEN, E. L. & ANDERSON, H. H. An Essentially Synthetic Liquid Medium for *Entamoeba histolytica*. *Parasitology* 1948, July v 39 No. 1/2 69-72. (13 refs.)

The nutritional requirements of *Entamoeba histolytica* in culture with "organism 1" were studied, and a liquid medium was devised to maintain the amoebae in an actively reproducing form. Subcultures were performed every

four days by which time the amoebae numbered 400,000 per culture tube, the transfer consisting of 0.25-0.5 cc of the sediment. The medium was prepared from stock solutions kept at varying concentrations and diluted to the necessary strength with distilled water, sterilization was effected by autoclaving at 120°C for 7 minutes. The pH range was from 7.48 on the day of transfer to 7.1 in four-day-old cultures. The medium contained the following constituents—buffered saline, 5 trace minerals, 12 amino-acids, 10 vitamins of the B complex, nucleic acid, cholesterol and, finally, rice powder, the only non-synthetic ingredient though the presence of the organism *I* was also essential for proper growth. The critical requirements of the ingredients are being further studied.

P C C Garnham

DERRICK, E. H. A Fatal Case of Generalized Amoebiasis due to a Protozoon closely resembling, if not identical with, *Iodamoeba bütschlii*. With a Comment by C. M. WENYON. *Trans Roy Soc Trop Med & Hyg* 1948, Sept., v. 42, No 2, 191-8, 21 figs on 4 pls

This unique case of amoebiasis differed from other fatal cases that occurred in Japanese prisoners of war in the wide and bizarre distribution of lesions. The stomach, small intestine and colon were ulcerated, and metastatic foci were present in the brain, both lungs, gastric and mesenteric lymph glands, but not in the liver. In most of the lesions the amoebae are exceedingly numerous.

The organism is definitely not *Entamoeba histolytica*, but closely resembles *Iodamoeba bütschlii*. The patient, a Japanese soldier, aged 22, was captured near Buna, New Guinea. He was treated for malaria and dysentery, but failed to respond and died on the sixth hospital day. At post-mortem, the surface of the brain showed a depressed area in the lateral aspect of the right parieto-occipital region. The stomach showed numerous shallow ulcers, they were rounded, irregular or confluent. In the small intestine at the midpoint there was an ulcer with yellow edges and congested floor. Seven rounded ulcers were present in the large intestine, resembling those in the small. The presence of amoebae, often in enormous numbers, is the most significant feature in the histology. They show the same morphology everywhere. In size they vary considerably—the extremes being 3 μ and 12 \times 9 μ —averaging 6-8 μ , about that of the neutrophil leucocytes.

The cytoplasm, granular and foamy, occasionally includes small vacuoles and ingested red blood corpuscles, especially in the brain lesion. The nucleus usually measures 2 to 2.5 μ in diameter and consists of a large, central karyosome, surrounded by a clear zone which in turn is encircled by a delicate nuclear membrane. Sometimes the karyosome is indented, and this may represent a stage in division. Occasionally the amoebae contain two nuclei, which is evidence of their rapid multiplication. No forms resembling cysts were recognized. The large central, spherical karyosome and delicate nuclear membrane resemble those of *Iodamoeba*. The size of the trophozoites is also consistent with that reported for *I. bütschlii* in faecal smears. [No adequate examination of the faeces appears to have been made.]

In its behaviour in the tissues, this amoeba resembles *E. histolytica* but the distribution of the lesions is unusually extensive, even for *E. histolytica*, and histolytic action is well demonstrated in the brain sections where red cells are being ingested. As with *E. histolytica*, so in the intestinal ulcers, amoebae are found most frequently beyond the area of cellular reaction. Dr C. M. Wenyon also examined the material in consultation with Dr C. A. Hoare and agreed that the similarity with *I. bütschlii* amounts almost to complete identity. It would not be justifiable to consider the amoeba as a new species. It appears to be an instance of unusual invasion of the various organs by an amoeba from the intestine.

SEAL, S. C. On the Control and Prevention of Endemic Cholera in the Rural Areas of Bengal. *J Indian Med Ass* 1943 July 17 No. 10 319-1

Suggestions are made for (a) short term or temporary measures and for (b) long term or permanent measures for the control and prevention of cholera in rural Bengal.

The short term measures recommended are (1) early notification by the village authority (2) visit by a health officer with suitable supplies for disinfection and treatment (3) treatment of the cholera case with sulphaguanidine and oral administration of 4 lb water or sodium-bicarbonate-glucose solution (intravenous saline only in advanced cases) (4) prophylactic administration of acid mixture (3 parts acid sulphuric aromat and 1 part spt. chloroform, in water) to all contacts and sulphaguanidine to contacts showing suspicious symptoms (5) isolation and hospitalization of cases in temporary sheds or mobile camps, (6) anti-cholera inoculation. (The author has considered it advisable to avoid inoculation of the members of an affected family for at least three days as there may be a risk that the measure would be discredited if members inoculated during the incubation period develop cholera.)

Long term measures.—The author considers that "investigation into the local circumstances and factors which operate in causing repeated outbreaks is a pre-requisite for planning effective preventive measures." For the purpose it is suggested that a "special Epidemic Control Unit" should be formed to take care of the infectious diseases of a sub-division with an average population of 800 000 at an annual cost of about 1 anna per capita. While carrying out control work, the Unit would keep continuous records of communicable disease in its area, which might be used for forecasting epidemics so that early measures could be adopted to abort them.

The provision of a "Segregation Cottage" in each village is advocated so that early cases may be isolated. The author does not consider general yearly reinoculation to be feasible but for the prevention of importation of infection believes that cholera could be greatly reduced by insistence on inoculation 7 days before departure to attend a *mela* or a religious congregation and on yearly reinoculation for those regularly visiting trading centres or industrial areas. For reinoculation the author prefers the intradermal administration of 0.1 cc. of the vaccine.

The importance of *melas* and pilgrimages in the dissemination of infectious disease is recognized by the recommendation for the provision of permanent sanitary arrangements at major perennial centres and for special measures at smaller *melas* and festivals of short duration.

The necessity for health teaching in school and community life is stressed. [The measures of more permanent nature which are essential for the reduction of the risk of cholera in the endemic areas are not dealt with in this paper namely provision of protected water supplies and improvement in environmental sanitation.]

J. Tasker

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

HANSEN E. L. & ANDERSON H. H. An Essentially Synthetic Liquid Medium for *Entamoeba histolytica*. *Parasitology* 1948, July 33 No. 1/2 69-72. [13 refs.]

The nutritional requirements of *Entamoeba histolytica* in culture with "organism 1" were studied, and a liquid medium was devised to maintain the amoebae in an actively reproducing form. Subcultures were performed every

medium recommended by CHORINE [see this *Bulletin*, 1943, v 40, 917] with fresh rabbit serum, gave negative results in all subcultures. Experiments on the culture of the spirochaetes in incubating eggs gave 12 negative results and 7 positive, the number of passages in these ranging from 1 to 19. It was found necessary to use only two drops of heavily infected defibrinated blood (or slightly citrated), and the blood had to be inoculated as soon as possible. For passages from egg to egg, the blood of the embryos was mixed with the allantoic fluid and slightly citrated. When successful, the spirochaetes appear in the blood of the embryo 3 or 4 days after inoculation, and persist until the embryo is ready to hatch. The passages are very difficult and irregular, and after the 14th passage the spirochaetes undergo morphological changes suggestive of degeneration.

E Hindle

BALTAZARD, M., BAHMANYAR, M. & MOFIDI, C. Sur les infections à spirochetes transmises par les Ornithodores en Iran [On Spirochaetal Infections transmitted by *Ornithodoros* in Iran.] *Bull Soc Path Exot* 1948, v. 41, Nos 3/4, 141-6

The authors have examined the two species of rodents commonly associated with man in Iran, namely the common mouse *Mus musculus*, and the small hamster *Cricetulus migratorius*, to see whether they act as reservoirs of *Spirochaeta persica*, transmitted by *Ornithodoros tholozani*.

Numbers of these rodents were caught in houses in a small village, Hessarek, during January to March 1946, 65 mice and 69 hamsters were killed in lots of 3 or 4, and an emulsion of the brains of each lot was inoculated into a guinea pig rat and mouse, respectively. On only one occasion was a spirochaete isolated from wild mice, and this was found to be *S. persica*. Subsequently a total of 127 mice, 380 hamsters, 4 bandicoots, 25 *Rattus norvegicus*, 5 *R. alexandrinus*, 83 *R. frugivorus*, 4 porcupines and 2 foxes were examined, with negative results so far as this spirochaete was concerned. On the other hand, an organism described by RAFYI [see this *Bulletin*, 1947, v 44, 92] as *Spirochaeta microti*, was often found in both mice and hamsters. Large numbers of *Ornithodoros erraticus* were collected from the burrows of animals in various parts of Iran and by feeding these ticks on white rats, 15 strains of *S. microti* were obtained. These varied considerably in their pathogenic properties, some strains producing either inapparent infections or blood infections of only 24 to 48 hours duration, and others an infection with spirochaetes in the blood for 28 days.

Two human subjects inoculated with blood containing numerous spirochaetes, showed a slight febrile reaction with the presence of very rare spirochaetes in the circulation. Another subject was bitten by naturally infected *Ornithodoros* from a burrow, and showed a febrile reaction, but without any spirochaetes being found in the blood, another person bitten by ticks infected in the laboratory showed a febrile reaction associated with the presence of rare spirochaetes.

Finally the author gives a list of spirochaetes from the Old World rodents which seem to be either identical or closely related, and all transmitted by species of *Ornithodoros*, as follows —

Spirochaeta crociduræ Léger, 1917, in Dakar, transmitted by *O. erraticus*

S. naganophila Savini, 1923, in white mice

S. normandi C. Nicolle, Anderson and Colas-Belcour, 1927, in South Tunisia, transmitted by *O. normandi*.

The spirochaete isolated from the brain of a rodent at Katanga by Adant, 1932. The spirochaete found in *O. erraticus* in South Morocco by Baltazard and subsequently in rodents by G. Blanc and provisionally named *Spirochaeta merionesi*.

On the analogy with *E. histolytica* which often exists in the intestine without further invasion, it is reasonable to assume that conditions arose which enabled this common coprozoid species to invade the tissues.

The phagocytosis of red blood cells by *E. histolytica* has not been previously recorded.

The paper is illustrated by 3 photographs and 18 excellent photomicrographs.
Manson Bahr

CRITCHLEY C. I. Liver Abscess: Sporadic Amoebiasis. [Memoranda.] *Brit Med J* 1948 Oct. 9 681 2.

This letter relates to a man of 34 who had never been out of Britain nor had had any tropical associations, but who developed a liver abscess without previous illness.

He presented with a history of five-day epigastric pain worse on deep inspiration and associated with vomiting. No mass was felt and the liver was not palpable. There was a leucocytosis of 27,000 per cmm. (81 per cent. neutrophils) and the diaphragm on X-ray examination was shown to be raised about 1 inch. After 5 days of continued symptoms the abdomen was opened and a large very soft liver was found reaching to the right iliac fossa. Five pints of "anchovy-sauce" pus were aspirated on exploration of the right lobe of the liver; a further loculus yielded one pint of yellow pus. Penicillin (100,000 units) was instilled in the cavity which was drained.

The pus was sterile and no amoebae nor cysts were found in it nor in the stools on repeated examination. No radiographic abnormality was found in the bowel. Sigmoidoscopy showed "the smooth pale glossy and rather rigid mucous membrane associated with chronic amoebiasis." A full anti-amoebic course was therefore given with immediate and dramatic response.

[The nature of the anti-amoebic treatment or of the dramatic response is not described. The latter is complicated by the fact of penicillin having been given in a case where examination of the pus was negative. However significant the findings as the present data undoubtedly are, an unqualified diagnosis of sporadic amoebiasis in the absence of amoebae, specific changes in the bowel or of known exposure and in the presence of a marked neutrophile leucocytosis, is perhaps a bold one.]
H. J. O. D. Burke-Gaffney

NIGO F. L. Estudio clínico y parasitológico de un caso de colitis leve por asociación de *Balantidium coli* y *Endamoeba dysenteriae*. [A Case of Ulcerative Colitis associated with the presence of *Balantidium coli* and *Endamoeba histolytica*.] *Revista Med. 4 germa.* 1948 Aug 13, v 35 No. 33 1901-4 15 figs.

RELAPSING FEVER AND OTHER SPIROCHAETOSIS

BALOGH L. Le spirochète de la récurrent de la dernière épidémie de spirochétose Nord Africaine. [The Spirochaeta in the Last Epidemic of North African Relapsing Fever.] *Bull. Soc. Path. Exot.* 1948, v 41 Nos. 3 & 4 146-9.

The author has studied the properties of a strain of the louse-transmitted spirochaete isolated from cases of the disease during the great epidemic in North Africa (see this Bulletin 1948 v 43 44). Inoculation into mice produced very slight infections which only lasted for a few hours and it was never possible to continue passages in mice. Attempts at cultivation with the

Spirochaeta microti is of the same type and all these strains are transmissible both by *Ornithodoros erraticus*, and probably allied species, and also by lice. As the infection is widely distributed in rodents they constitute a source of danger, especially as they can be transmitted by *Pediculus*.

This group of spirochaetes, probably identical with *S. crociduræ*, is very distinct from those belonging to the *duttoni* group which have different biological properties and are transmitted by other species of *Ornithodoros*. *E. Hindle*

ZAHARIA, N. I. Viteza de sedimentare a hematului in cursul febrei recurente [The Erythrocyte Sedimentation Rate in Relapsing Fever.] *Rev Ştiinţelor Med* Bucharest 1948, May-June, v 37, Nos 5/6, 209-17, 2 figs. French summary

The author in 1945-46 working in the Stamate Hospital, Fălticeni, Rumania, studied the ESR daily in 58 cases of relapsing fever. Several variations were recognized, but in general the rate was markedly increased both during an established attack and when there were few or no symptoms. Between the attacks, levels became more or less normal, and they returned completely to normal about 5 to 15 days after the end of the disease.

These findings in relapsing fever appear to be the reverse of those observed by the author previously in cases of epidemic typhus (*Rev Ştiinţelor Med*, 1946, v 35, 317) and he suggests that this difference might be of value in differential diagnosis in some cases.

The findings are illustrated graphically in two figures.

H. J. O. D. Burke-Gaffney

YAWS

SCHIRPENHUYSEN, A. A. Bismuth en behandeling van framboesia tropica [Bismuth in the Treatment of Yaws] *Nederl Tijdschr v Geneesk* 1948, Sept 4, v 92 (III), No 36, 2741-9 [17 refs] English summary (7 lines) [20 refs]

A total of 2 067 sufferers from yaws were treated with bismuth, with mapharsen or with bismuth combined with arsenical preparations. It became apparent from the duration and from the results of treatment that the three methods gave practically the same results. Possibly those patients treated with mapharsen were more satisfactory. The favourable results of the work of a mobile anti-yaws team are commented upon. The author was medical officer to the 13th mobile team of the Netherlands Red Cross, working on the east coast of Sumatra.

P. Manson-Bahr

LEPROSY

TEICHMANN, G. O. What of the Children? *Leprosy in India* 1948, Apr, v 20, No 2, 103-8

This obscure title refers to a valuable report on the ultimate results in children treated at the 6 Children's Homes in the Purulia Leper Home and Hospital during the past 20 years including those in the Home before 1927, since when accurate records have been kept, and those admitted during three 5-year periods up to 1942. Only 2 of 63 healthy children, who had been exposed to infection before admission, developed leprosy previously to 1927 against a possible infection rate in their infected homes of 25 to 30.

S. latyscheki found in the rodents of Uzbekistan by Pavlovsky and his fellow workers in 1945 transmitted by *O. tartakowskyi* [See this Bulletin, 1946, v 43 743]

Finally *S. microi* found in Iran by Rafiyi in 1946 described in the present communication
E. H. HALL

DELPHY L. P. RAFFI A. & MAGHAMI G. D. Transmission de *Spirochaeta microi* Rafiyi 1946 par *Ornithodoros canestrini* (Birula 1894) et *Ornithodoros lahorensis* Neumann 1908. [The Transmission of *Spirochaeta microi* Rafiyi 1946 by *Ornithodoros canestrini* (Birula 1894) and *Ornithodoros lahorensis* (Neumann 1908)] Bull. Soc. Path. Exot. 1948, v 41 Nos 34 138-9

The authors have succeeded in transmitting *Spirochaeta microi* from infected rats or mice to normal rats by the bites of *Ornithodoros canestrini* and *Ornithodoros lahorensis*. The ticks were fed on the infected rodents and then after intervals ranging up to 300 days, fed on normal rats or in one case, the content of the tick were ground up and inoculated into rats.

It is curious that these ticks can serve as the host of this spirochaete of wild rodents as hitherto all attempts to transmit *S. persica* by these two species had given uniformly negative results.
E. H. HALL

BALTAZARD M. MOFIDI, G. & BAKMANYAR, M. Essai de reclassement de certains spirochètes récurrents. [An Attempt to reclassify certain Relapsing Fever Spirochaetes.] Bull. Soc. Path. Exot. 1948, v 41 Nos. 58 309-403.

The authors summarize information on the spirochaete found in rodents and also in *Ornithodoros erraticus* collected in burrows in both north and north Iraq. This organism, known as *Spirochaeta microi* is transmissible both by ticks and also the louse *Podoculus humanus*.

The study is based on the examination of 17 strains. New-born rodents can be infected either by the inoculation of blood containing spirochaetes or the bites of infected *Ornithodoros*. The incubation period is always less than five days and invariably fatal on the 2nd to 4th day of infection with very large numbers of spirochaetes in the blood. White mice grey mice hamsters bandicoots, white rats and rabbits give similar results but new-born guinea pigs which are born at a later stage of development are resistant and only show a feeble infection which is never fatal.

Adult mice after inoculation show an incubation period of 8 days followed by 10 to 12 days during which the blood may contain up to 100 spirochaetes per field. The type of infection in these animals is very constant. Other rodents show very great differences in their susceptibility and adult guinea pigs seem to be completely resistant.

The pathogenicity of 3 strains has been tested in 9 human subjects. Some were inoculated with infected blood and others infected by the bites of *Ornithodoros erraticus*. There was an incubation period of 4 to 10 days, followed by 3 to 5 febrile attacks not exceeding 3 days each and with a total duration of 30 to 51 days. Spirochaetes were found in the blood usually only after several examinations, and were never numerous. No meningeal or nervous symptoms were ever observed.

The authors then studied a strain of *S. marsei* from South Morocco, and found that it was much more virulent to white rats hamsters, etc. often producing a fatal infection.

Finally the original strain of *S. erousaei* isolated at Dakar more than 20 years previously was obtained and in its properties found to resemble closely *S. marsei*.

Spirochaeta microti is of the same type and all these strains are transmissible both by *Ornithodoros erraticus*, and probably allied species, and also by lice. As the infection is widely distributed in rodents they constitute a source of danger, especially as they can be transmitted by *Pediculus*.

This group of spirochaetes, probably identical with *S. crocidurae*, is very distinct from those belonging to the *duttoni* group which have different biological properties and are transmitted by other species of *Ornithodoros*. E Hindle

ZAHARIA, N I Viteza de sedimentare a hematului in cursul febrei recurente [The Erythrocyte Sedimentation Rate in Relapsing Fever] *Rev Științelor Med* Bucharest 1948, May-June, v 37, Nos 5/6, 209-17, 2 figs French summary

The author in 1945-46 working in the Stamate Hospital, Fălticeni, Rumania, studied the ESR daily in 58 cases of relapsing fever. Several variations were recognized, but in general the rate was markedly increased both during an established attack and when there were few or no symptoms. Between the attacks, levels became more or less normal, and they returned completely to normal about 5 to 15 days after the end of the disease.

These findings in relapsing fever appear to be the reverse of those observed by the author previously in cases of epidemic typhus (*Rev Științelor Med*, 1946, v 35, 317) and he suggests that this difference might be of value in differential diagnosis in some cases.

The findings are illustrated graphically in two figures

H J O'D Burke-Gaffney

YAWS

SCHERPENHUYSEN, A A Bismuth en behandeling van framboesia tropica [Bismuth in the Treatment of Yaws] *Nederl Tijdschr v Geneesk* 1948, Sept 4, v 92 (III), No 36, 2741-9 [17 refs] English summary (7 lines) [20 refs]

A total of 2,067 sufferers from yaws were treated with bismuth, with mapharsen or with bismuth combined with arsenical preparations. It became apparent from the duration and from the results of treatment that the three methods gave practically the same results. Possibly those patients treated with mapharsen were more satisfactory. The favourable results of the work of a mobile anti-yaws team are commented upon. The author was medical officer to the 13th mobile team of the Netherlands Red Cross, working on the east coast of Sumatra.

P Manson-Bahr

LEPROSY

TEICHMANN, G O What of the Children? *Leprosy in India* 1948, Apr, v 20, No 2, 103-8

This obscure title refers to a valuable report on the ultimate results in children treated at the 6 Children's Homes in the Purulia Leper Home and Hospital during the past 20 years, including those in the Home before 1927, since when accurate records have been kept, and those admitted during three 5 year periods up to 1942. Only 2 of 63 healthy children, who had been exposed to infection before admission, developed leprosy previously to 1927 against a possible infection rate in their infected homes of 25 to 30.

One hundred and fifty-one children were in the Homes in 1927. Of 63 in the "Healthy Homes" where the children have been separated from leprosy relations 56 (89 per cent.) are now well. Of 54 with neural leprosy 23 are well, but of 34 lepromatous cases none are well. 18 are dead and only "improved" debility and tuberculosis were the common causes of death. Between 1927 and 1942, 120 children were admitted to "Healthy Homes" 36 are still well and remain in the Homes. 56 are at work or married many with healthy children. 23 developed signs of leprosy and were returned to the Colony but only six now have active disease, 11 are dead and 11 untraced.

Again 120 children were admitted after 1927 to "Observation Homes" for neural cases and those in whom bacilli cannot be found, and 73 are still well. 13 have active disease 9 are much better. In 7 the disease is arrested with deformity 8 are dead and 10 untraced. Similarly of 132 children admitted to "Infectious Homes" in 1928 to 1942, 6 remain healthy 26 improved and left, 73 still have active disease 4 have arrested disease with deformity 20 are dead and 4 untraced. Thus children who were separated from their infected parents either remained free or developed only a mild form of leprosy the great majority of them becoming symptom-free without deformity on treatment these children did not show the severe form they often show if left with their infected parents or relations. The use of this plan on a large scale should therefore result in far fewer leprosy cases later.

L. Rogers

JUÁN PUIGRÓS P. Una cepa española del *Myc. leprae* (Harven) Lehmann et Neumann. [A Spanish strain of *Mycobacterium leprae*] *Rev. Fisiol. Valencia*. 1948 Jan. v. 2, No. 1, 33-45. 6 figs. on 3 pls. [109 refs.] English summary

After a brief sketch of the numerous reports of bacteria cultivated from leprosy patients the author describes an organism isolated from a leproma carefully removed triturated and planted on various media, and part homogenized for studying the morphology of the many bacteria present. Morphologically those isolated were typically like *Myc. leprae* and stained in the same way. Growth was slow after 3 years the colonies were only 8-10 mm. in diameter on Löwenstein's red and Löwenstein's green media, on Dorset-Petroff, Petragiani without asparagine, or de Saenton and vitamin B and C. There was no growth on the ordinary media. The organism will grow at room temperature but the optimum is 36-38°C. It is pathogenic to the white rat the mouse the guinea pig and the rabbit.

The author maintains that it is a strain of *Myc. leprae* on the grounds of its morphology and staining reactions, of its not belonging to the acid-fast saprophytic group of its pathogenicity for rats and mice. It differs from John's bacillus. It was obtained from a leproma extirpated aseptically. In conclusion, he compares it with and indicates the differences from the organisms of Duval and Clegg, Barry Hedrowsky, Llera, Vandremmer, Reentjerna and others.

H. Harold Scott

ALVAREZ LOWEL, L., RODRIGUEZ PEREZ, A. P. & PUIGRÓS, J. R. La participación de los centros nerviosos en el sustrato histopatológico de la lepra. [The Histopathology of the Nervous Centres in Leprosy] *Rev. Fisiol. Valencia*. 1948 July v. 2, No. 2, 101-14. 23 figs. on 8 pls.

The authors have studied the morbid histology of the nervous system, central and peripheral, in three cases of leprosy. Fragments were fixed in 10 per cent formalin in 15 per cent neutral formalin, in Cajal formalin bromide and in rectified

spirit Some sections were made of frozen tissues and some by the paraffin-embedding method Several silver impregnation methods were used, as well as haematoxylin and eosin, and Sudan III The different parts, the peripheral nerves, neuroglia, grey and white matter are described in minute detail The posterior tracts, particularly that of Goll, are picked out and, to a less extent, the lateral tract Higher up the nerve cells are degenerated and there is marginal and perivascular gliosis In general it is said that the response is that characteristic of toxic action leading to central degeneration, secondary to initial gliosis In the optic nerve and chiasma there is acute oedema of the dendroglia "The histological picture is in part due to peripheral lesions arising in the ganglia and nerves, and in part to toxic processes similar to those met with in chronic, non-specific affections" The conditions described in the text are well shown in a series of 23 photomicrographs H Harold Scott

DE DULANTO, F La biopsia por aspiración de la médula ósea en la lepra Técnica y resultados [The Bone Marrow in Leprosy] Rev "Fontilles" Valencia 1948, Jan, v 2, No 1, 4-16, 8 figs (7 on 4 pls) [36 refs]

LOWE and DHARMENDRA found, in 16 out of 32 nodular leprotics, bacilli in the bone marrow, but in only one out of 18 with the nervous type of the disease The author has examined the marrow obtained by sternal puncture in 13 patients with "leprotic leprosy" [*i.e.* with lepromata] and 8 with the leprous reaction By the usual method he withdraws 2-3 cc of marrow In 6 of the 13 with lepromata he found *Myco leprae*, in two of them typical Virchow cells charged with the bacilli In all these, the skin, the nasal mucosa and the lymph glands were also positive, as they were even in those whose marrow proved negative The myelogram showed, in addition to the Virchow cells, a meta-myelocytosis, eosinophiles normal or slightly increased and an erythroblastic reaction The peripheral blood of the positive cases showed a neutrophilia, a slightly increased eosinophilia (but not constantly), monocytes on the high side, in the reactions up to 15-20 per cent The marrow changes are ascribed to simple inflammatory or specific granulomatous lesions with inadequacy of haemopoiesis and consequent anaemia and leucopenia in the peripheral blood slides

Since the sulphone derivatives—promin, diasone, promizole, sulphetrone—provoke haemolytic anaemia and leucopenia, even agranulocytosis, it is thought that periodic examination of the marrow may serve to indicate danger arising from the use of these drugs H Harold Scott

NUÑEZ V Los casos indeterminados de lepra Revisión general [A Review of "Indeterminate" Cases of Leprosy] Rev "Fontilles" Valencia 1948 July, v 2, No 2, 115-60, 7 text figs, & 14 figs on 5 pls [Bibliography]

GOLD, S Leprosy in British Nationals Brit J Dermat & Syph 1948, Apr, v 60 No 4, 139-43 1 fig [13 refs]
An account of two cases

SILVEIRA, L M O mal perfurante plantar na lepra [Perforating Ulcer of the Foot in Leprosy] Rev Brasileira Leprologia, S Paulo 1948, Mar, v 16, No 1, 7-32, 40 figs

A well-illustrated account of perforating ulcer of the sole in leprosy Photographs show the clinical conditions of these ulcers in their various stages and X-rays demonstrate the bony changes If the patient comes under observation early, that is before any bone erosion has occurred, the lesion clears up

rapidly in 3 weeks or so the patient resting the limb and keeping the foot encased in plaster. If however the bony structures have become involved, operative treatment is necessary—disarticulation of the tarsal joints, the metatarsals and phalanges, resections and amputations—according to the stage and the extent of involvement. Among 3 000 inmates of the Pirapitingal colony in São Paulo 693 such operations were performed. *H. Harold Scott*

GUTTEN J & IMURA A. Intensas leproreacciones sobre un injerto cutáneo [Intense Leprosy Reactions over a Skin Graft.] *Rev. "Fonolitos"* Valencia, 1948, J. n. v. 2, No. 1 27-9. Egs. on 1 pl.

SCHUJMAN S. Comparative Study of Chaulmoogra in High Doses and Promin in the Treatment of Leprosy. *Internat. J. Leprosy*, 1948, Apr-June v. 16 No. 2 145-6

The author in Rosario, Argentina, injected both intramuscularly and intradermally monthly doses of 120 to 150 cc., according to tolerance of ethyl ester chaulmoograte with 4 per cent creosote or 0.5 per cent iodine. Promin was given intravenously in doses of 5 gm. daily except on Sundays, up to a total of 500 gm. in a series, with fifteen days rest after each series. Although no patient gave up treatment, chaulmoogra caused more discomfort than promin. Treatment for eighteen months showed both drugs to be efficient with similar favourable results within the same period of time as regards both dermal and mucous membrane lesions and with the same fragmentation and diminution of lepra bacilli and healing of erosions and ulcerations. Longer observations are necessary to establish whether one of the two is more effective.

L. Rogers

COCHRANE R. G. A Comparison of Sulphones and Hydnocarpus Therapy of Leprosy. *Internat. J. Leprosy*, 1948 Apr-June v. 16 No. 2, 139-44

The author only considers the lepromatous class of cases in which sulphones have been favourably reported on. He concurs in the opinion of SCHUJMAN (this Bulletin 1948, v. 45 441) that the success of hydnocarpus treatment is largely dependant on dosage up to 400 cc. in a year and on the use of the intradermal method. Six years work showed 17.5 per cent. negative and 40.2 per cent. improved by equal dosage subcutaneously and intradermally against 12.3 per cent. and 34.2 per cent. respectively with 15 cc. of the oil injected per week, which is the optimum dose. Moreover in 167 early lepromatous cases 84 (50.3 per cent.) became negative under adequate dosage of hydnocarpus oil after an average of 84 weeks treatment.

On the other hand, two years trial of sulphones confirmed the work of PAGET and others although no case has yet become negative bacteriologically so the time required to effect this is still too long. Promin was the least satisfactory preparation and too toxic for Indian patients. Sulphetone appears to be the drug of choice for dissonant precipitates reactions in 23 per cent. of cases. The author prefers to commence with 4 tablets a day and increase by two every second day up to 12 daily and does not allow any rest period unless the red corpuscles fall below 3 million and the haemoglobin below 45 per cent. The bowels must be kept freely open as constipation may be dangerous.

The disadvantages of sulphone treatment are the necessity for close daily supervision and the present prohibitive cost for large numbers of Indian patients. The author therefore gave sulphetone in an emulsion with 25 per cent. arachis oil and 0.5 per cent. beeswax to obtain blood level of 1 to 3 mgm. per cent. and skin concentrations of 5 to 17 mgm. per gramme of skin tissue on

injection, by which means relatively small doses are required. Thus, in two similar cases much greater improvement clinically and bacteriologically was obtained by the injection of 70 gm of a 25 per cent suspension of diamino-diphenyl sulphone in eleven months than by giving 2,471.5 gm of sulphethrone orally for 16 months. A method of examining sixteen smears from each patient to obtain a bacteriological index is advised for the control of results.

The author therefore advises sulphones only in advanced lepromatous cases, especially those with nasal and laryngeal symptoms, and in cases not improving on adequate hydnocarpus treatment or who have relapsed. Intensive intra-dermal use of hydnocarpace is insisted on, as it accounts for the better results in lepromatous cases under hydnocarpace than under sulphones in Indian patients.

L Rogers

SHARP, E A & PAYNE, E H The Present Status of the Sulfones in Therapy
Internat J Leprosy 1948, Apr-June, v 16, No 2, 157-72 [161 refs]

This paper, which should be read by those interested deals mainly with history of sulphone preparations. Promin has proved not to be dangerously toxic. Promizole is useful in leprosy, but is difficult to make and is expensive. Promacatin is of use in pneumonia and leprosy and diasone and sulphethrone in the latter disease. Benadryl is a useful adjunct in treatment of the lepra reaction.

L Rogers

DE SOUZA LIMA, L & others Present Status of Sulfone Therapy at the Padre Bento Sanatorium
Internat J Leprosy 1948, Apr-June, v 16, No 2, 127-37

This is a report on the sulphone treatment in 1,287 leprosy patients during four and a half years in São Paulo, Brazil. The results confirm other experience and establish its value. The disease ceases to progress after from three to six months regardless of the degree of advancement of the case. For example, none of 847 lepromatous cases treated for 12 to 36 months have grown worse, but 4.2 per cent did not improve. During the first six months, temporary aggravation of the symptoms may occur in 12 to 15 per cent of the patients, but later no relapses have occurred. The degree of improvement varies from slight to total disappearance of the lesions. The beneficial results affect mucous membranes of the nose, mouth, pharynx and larynx, and tracheotomized patients have been able to dispense with their tubes. The progress of eye lesions to total blindness has also been almost entirely prevented under intensive treatment, and extensive corneal infiltrations may largely clear up and become free from lepra bacilli.

A table based on 584 advanced lepromatous cases shows lesions cleared in 8 per cent, much improved 24 per cent, improved 64 per cent and unchanged 4 per cent. In about 7 per cent improvement became stabilized and remained stationary after 18 to 20 months' treatment. In 50 per cent, eruption of erythema nodosum, or less frequently of erythema multiforme, occurred, this is regarded as a favourable sign. Better results were seen in 158 moderately advanced lepromatous cases with 53 per cent cleared up, 34 per cent much improved, 9 per cent improved and 4 per cent unchanged. Another table deals with 99 incipient cases, with 67 per cent cleared up, 14 per cent much improved, 19 per cent improved and none unchanged or worse, the advantage of early treatment is thus apparent.

On the other hand, in lesions of the peripheral nervous system the results have been nil or insignificant, so it is important to start treatment early, before such lesions have occurred.

In tuberculoid cases the tendency to spontaneous recovery makes it difficult to evaluate the effects of sulphone treatment. Some tuberculoid cases pass into the lepromatous form, or invade nerves with resulting marked mutilations in 25 of the latter variety in which tuberculoid lepra reactions had been common sulphones prevented the recurrence of such reactions, and the cutaneous lesions disappeared or reverted to an uncharacteristic appearance although nerve lesions were uninfluenced. Similar results were observed in 200 dispensary cases but the skin lesions in most of them were not completely cleared up after 12 months treatment. They should also be treated early.

The uncharacteristic cases are still difficult to evaluate because 40 per cent cleared up spontaneously and no cases have become lepromatous. In lepromatous cases bacteriological findings in nasal smears showed a reduction of positive results to only 2 per cent after treatment with presumably much reduced infectivity but in advanced lepromatous cases scarification of the nasal mucous membrane gave positive results in 102 out of 879 smears or 11 per cent. In skin lesions the results were less favourable for in 64 biopsy specimens of residual lepromas only 10 per cent were negative, although morphological changes and reduced numbers of bacilli were frequent. Sections of the sites of old lesions were negative in 50 per cent and in 45 per cent only small numbers of morphologically modified bacteria were found. Histological improvement was common with a tendency to tuberculoid structure. The intravenous administration is preferred in all acute and ocular cases and in the occurrence of erythema nodosum. No serious accidents have occurred in four years.

L. Rogers

ERICKSON P. T. & JORANSEN F. A. Bone Changes in Leprosy under Sulfone Therapy. *Internat. J. Leprosy* 1948 Apr-June v. 18 No. 2, 147-54, 8 figs on 4 pls. [10 refs.]

Bone changes in leprosy depend on neurotrophic disorders due to nerve involvement of a chronic nature, so only slow response to treatment could be expected during the five years of this treatment in Carville of 82 patients with promin disease or promirole. Tables record the duration of the sulphone treatment, the bone changes in the hands and feet over a five-year period, and the neural symptoms and their probable response to treatment. Previous Carville studies suggest that in lepromatous cases there are few bone changes except in the form of cysts and osteomyelitis, and it is significant that these lesions appear to respond best to sulphone treatment. There also appears to result some restraint on further progression of bone absorption, so early treatment is indicated. A follow-up period of ten years likely to be required fully to assess results of this treatment. Four pairs of X-ray plates are included.

L. Rogers

MATZ J. Un bon médicament adjuvant dans le traitement de la lèpre [A Useful Adjuvant in the Treatment of Leprosy] *Bull. Soc. Path. Exot.* 1948 v. 41 Nos. 5 & 6 324-7

The following is a translation of the author's conclusion —

An American preparation Belvion consisting of a combination of liver extract peptonized iron and Vitamin B₁₂ may be used concurrently with chaulmoogra treatment of leprosy and without supplementary injection, to control effectively the anaemia and anaemia often seen in cases of leprosy. The attention of the French pharmaceutical manufacturers is drawn to this product.

H. J. O. D. Burke-Gallant

SAGHER, F & FRANCO, S El efecto de los rayos limite sobre las infiltraciones leprosas II Informe sobre el intento de influenciar la facies leonina y la ulcera perforante plantar por mediación de radiaciones roentgen de larga longitud [The Effect of X-Rays on Cutaneous Lesions and their contained Bacteria in Leprosy] *Rev "Fontilles"* Valencia 1948, July, v 2, No 2, 166-71, 16 figs on 5 pls

The treatment by X-rays lasted usually for 6-12 months; but changes were observable in 2-3 months Smears were made from the tissue during the course and biopsy specimens were taken periodically from the same spot each time, so that strict comparisons could be drawn Nine patients with nodular leprosy were subjected to the treatment, nodules and infiltrations of the hands and face and ulcers of the foot The improvement was quite distinct and in some instances the lesions actually disappeared Photographs taken before and after the course of treatment show the changes quite clearly Strange to say, however, smears from the lesions showed no significant changes in the bacterial content in many, though one *might* find disappearance of the leprous tissue accompanied by reduction in the number of bacteria and changes in their form Patients kept under observation for as long as 4 years after the treatment was begun did not, except in one case, show any relapse in the area radiated, if the dose had been fairly large (5,000-10,000 r), but new lesions might appear in their vicinity and elsewhere

H Harold Scott

APARISI JIJON T Nota previa del tratamiento de los lepromas recidivantes, episclerales y esclerales [The Treatment of Relapsing Episcleral and Scleral Lepromata a Preliminary Note] *Rev "Fontilles"* Valencia 1948, Jan, v 2 No 1 46-7

HINGSON, R A, JOHANSEN, F A, ERICKSON, P T, ELLIOTT, D E, MEYER W H, FITE, G L, WOLCOTT, R R & PREJEAN, B H Preliminary Study of the Hypospray for Parenteral Therapy in its relation to the Management of Leprosy *Internat J Leprosy* 1948, Apr-June, v 16, No 2, 173-8, 7 figs on 2 pls

This paper describes and illustrates an instrument for injecting solutions (promin, procaine, antibiotics, etc) under a pressure of 125 pounds of spring pressure through an orifice 0.003 of an inch in diameter—the size of a 26-gauge hypodermic needle and approximately that of the proboscis of a mosquito—the solution leaving the orifice at a velocity of approximately 600 miles an hour, or about twice the necessary pressure for such a fine jet to pierce the skin and subcutaneous fat The advantages claimed for it are absence of or greatly diminished pain on injection of various solutions, sterilization is unnecessary on account of preparation of the "metapules" which hold the solution, and painlessness prevents children fearing the injections The time of multiple sterilizations is saved, so that prolonged daily injections of various preparations including promin is facilitated It has also been used at Carville to afford instantaneous relief of nerve pains of leprosy by injection of procaine The new instrument is not yet on general sale as further improvements are expected, packing of the drugs in the metallic containers is at present only done by the Scherer Corporation, but it is hoped to be able to make it a reasonable cost, as a single instrument will outlast several syringes and many needles Two plates illustrate the instrument

L Rogers

- I. **LEPROSY REVIEW** 1948, July v 19 No 3 86-109 **Fifth International Congress of Leprosy** [Abstracts of Proceedings and Report of Committee.]
- II. **INTERNAT J LEPROSY** 1948 Apr-June v 16 No. 2, 235-317 **Summaries of Papers presented to the Fifth International Leprosy Congress, Havana, Cuba, Apr 8-11 1948.**

I. This account records the conclusions of the committees which studied the evidence under different subjects in the various papers read at the Congress. It has been written by Dr G. A. RYKIE who attended the meetings.

Report of the Committee on Therapy—Advances have been made owing to the use of sulphones and of increasing doses of hydnicarpus oil. The former are of great value in lepromatous cases of an advanced or moderately advanced type especially with respect to lesions of the nose throat and eyes, and they are the present drugs of election. The actions of promin, diasone and sulphetone are equal bacteriostatically and the following dosage is advised. Promin is given intravenously each day for one to three months in doses (for adults) increased after one or two weeks from 2 gm. in 5 cc. of solution up to 12.5 cc. and resumed after one to two weeks rest. Diasone is given orally on weekdays in doses of from 0.3 gm. daily increased by 0.3 gm. each week for three weeks and subsequently to 1.6 gm. daily if well tolerated, with 1 to 2 weeks rest every two months. Sulphetone may be used by injection or orally to produce a concentration in the blood of 5 mgm. per 100 cc., for which purpose daily doses of 3 to 6 gm. orally are required in adults, beginning with 0.5 gm. three times a day increased by 0.5 gm. per day to the required amount. In children 1.5 to 3 gm. daily are recommended. A period of rest is advised after six months. Any resulting anaemia is treated by iron, vitamin B complex, liver extract and thiamin chloride. The occurrence of erythema nodosum oriritis indicates temporary suspension of sulphones. Haemotoxic or renal reactions should be watched for.

Many workers have found large and regular dosage of hydnicarpus oil or its derivatives to be effective such as 15 to 25 cc weekly raised if it is well borne to 40 to 50 cc. per week. Some workers consider that the drug should be continued during reactions unless the eyes are affected. A period of rest may be advisable after every three and a half months treatment. Supplementary surgical and other methods should also be used. Further research is advised on antibiotics and other new preparations such as streptomycin and para-amino salicylic acid and on combinations of drugs. Sulphones should only be sold on medical prescription and it is hoped that their cost will be reduced.

Report of the Committee on Epidemiology and Control.—The difficulties of epidemiological enquiries are first stressed and the statistical control of clinical data collected over a number of years is advocated. A modified life table method should, if possible, be used to enable the magnitude of the problem in each area to be determined. In order to obtain uniformity various terms are defined. Under the heading of control, the Committee advised leprovaria of the agricultural colony type with separation of the infectious and non-infectious cases, and sanatoria for patients with personal financial resources within easy communication of an urban centre and not on a small island. The sod should allow of agricultural activities and the capacity should not exceed 1000 patients. Other recommendations are dispensaries and out-patient clinics selection of cases for isolation and treatment control of unisolated cases removal of children of infective patients to preventoria the control of contact with re-examination every six months for five years from the last contact with an infectious case and nurseries for newly born infants of leprosy patients—all measures which have been repeatedly advised for a number of

years Legal enactments should embody only general principles and regulations should be made by experts Education of medical students and the general public on leprosy is required The disease is frequently curable and only "open" cases need be isolated The word "leper" should be avoided as much as possible An appendix of recommended indices is added

Report of the Committee on Classification and Nomenclature—In an attempt to reconcile apparently discordant systems, classification should be based on clinical, bacteriological, immunological and histopathological data in diminishing order of availability The "polar" forms are lepromatous and tuberculoid, to which should be added indeterminate (undifferentiated) or I forms The degree of severity, manner of evolution, localization, morphology and clinical form should also be recorded

Report on the Words "Leper" and "Leprosy"—Cases should be designated "leprosy patient" and the term "leper" abandoned, but the former term should not be discarded A social assistance programme should include provision for healthy children, assistance of families of leprosy patients, education of the patients and their rehabilitation on leaving leprosaria

ii This consists of summaries of 153 papers and titles of 43 other papers presented at the Havana Congress, classified by subjects essentially as in the session programmes and for the most part in the language of presentation The language distribution is Spanish 66, English 55, French 22, Portuguese 10
L Rogers

SOARES, J A Os dispensarios na profilaxia de lepra (Considerações referentes ao serviço de profilaxia da lepra, no estado do Espírito Santo, de 1927 a 1945) [Dispensaries in Leprosy Prophylaxis as exemplified in Spirito Santo, Brazil, between 1927 and 1945] *Rev Brasileira Leprologia* S Paulo 1948, Mar, v 16, No 1, 35-51, 5 charts [17 refs]

Professor de Souza-Araujo more than a quarter of a century ago stated the aims of dispensaries in dealing with leprosy, which included a census of sufferers from leprosy, epidemiological inquiries in leprosy foci, selection of cases for ambulatory, domiciliary or hospital treatment, etc

A Leprosy Prophylactic Service was started in 1927 under the direction of Dr Pedro Fontes, in 1928 a census was taken and by 1931 290 cases had been noted By 1934, there were 8 dispensaries established in places where the incidence was highest In 1936, a plan was evolved for centralizing and controlling the activities of these dispensaries, for attracting the infected, the suspected and their contacts for examination, re-examination and treatment, an Assistance Service for the patient and his dependants, for getting hold of vagrant patients and for educating the children A colony was established in 1937 and two years later a home for the healthy children of leper patients Next follows an account of the staffs of these several dispensaries and a table showing the distribution of 1,000 patients in the eight dispensary districts, of these, 256 are interned Apart from the dispensaries at fixed places there is an itinerant service which pays periodic visits to other places and makes epidemiological investigations
H Harold Scott

HELMINTHIASIS

JANSSENS, P G De "A.E.X." concentratie methode voor wormeneieren [The AEX Concentration Method for Worm Eggs] *Ann Soc Belge de Méd Trop* 1948, June 30, v 28, No 2, 213-20 French summary

The author studied the use of the Acid-Ether-Xylol (AEX) concentration method for helminthic ova in faeces, a modification of the Telemann technique described by LOUGHLIN and STOLL [this *Bulletin*, 1947, v 44, 335]

Stool samples of 200 patients were examined by this method in parallel with direct microscopic examination.

The results which include egg counts species incidence multiplicity of infections and relative proportions of eggs recovered are shown in a number of tables. The author found the AEA technique to be eight times as effective as the direct smear and recommends it for routine use.

H J O'D Burke-Gaffney

EICHBAUM F W Potenciação da ação vermífida do hexylresorcinol por detergentes. Experiências *in vitro* com *Ascaris* de porco. [Effects of Detergents on the Vermifugal Activity of Hexylresorcinol. *In vitro* Experiments with Hog *Ascaris*.] *Mém. Inst. Butantan*. 1947 v 20 203-15. 1 fig English summary.

Three sets of tests were undertaken (1) The vermifugal action of hexylresorcinol alone of the detergents alone and of the combination of the two in physiological saline and in Tyrode's solution. (2) The synergistic activity of sodium anacardate and of the anacid fraction of cashew nut oil. By the "anacid fraction" is implied that part of the oil which remains after precipitation of anacardic acid by hydrosulfide of lead its chief components are cardol and anacardol. (3) The influence of the presence of mucus on the vermifugal action of hexylresorcinol alone and with detergents. The following substances were used in the tests 5 per cent. solution of hexylresorcinol 5 per cent. aqueous solution of sodium anacardate the anacid fraction of cashew oil (see above) 10 per cent anacardol in alcohol the oil itself, 10 per cent. in alcohol sodium tetrahydro-anacardate 5 per cent. in water and the following sodium salts ricinoleate oleate linoleate stearate and palmitate all in aqueous solution the first two 5 per cent. the third 1 and 2.5 per cent., the others 1 per cent. The effect on the worms *Ascaris* *swis* was watched through a glass-fronted apparatus.

The vermifugal effect of hexylresorcinol is enhanced by detergents in certain proportions but if the latter are high the effect is in part at least inhibited. Sodium anacardate anacardol, the anacid fraction and a tincture of the oil enhance the action especially the first and third of these. The first and last are fairly powerful vermifuges themselves.

In Tyrode's solution, the effectiveness is lowered, owing to the formation of insoluble Ca and Mg salts. Mucus inhibits the anthelmintic activity of hexylresorcinol, but very slightly if detergents are present. H Harold Scott

LEÃO, A. T & EICHBAUM F W Ação vermífida do óleo de cajá (*Anacardium occidentale*) e derivados. Experiências em cães. [Vermifugal Activity of the Cashew Oil (*Anacardium occidentale*) and Derivatives. Experiments in Dogs.] *Mém. Inst. Butantan* 1947 v 20 15-30 English summary

More than a century ago in 1806, DUCHENNE recorded the use of Cashew oil, *Anacardium occidentale* in helminthiasis and Eichbaum (*Nature* 1944, Apr 6, 449) the vermifugal action *in vitro* of anacardic acid, one of the constituents of the oil. The oil is contained in the pericarp. The present paper reports the results of giving the oil to infested dogs. Twenty-six dogs were used for these experiments and the infections were by *Incystosoma caninum* *Tetracera uris*, *Trichuris vulpis* and *Dipylidium caninum*. Four preparations of the oil were tested sodium anacardate an emulsion containing 20 per cent. of the pure oil and the crude oil itself, anacardic acid, and a mixture of cardol and anacardol. Tables are presented showing the details of all the experiments carried out, but these may be summarized by saying that the best results were

obtained with the pure oil. The drug was given in gelatin capsules each containing 1 gm, or by stomach-tube, and in doses from 2.5 to 8 gm according to the weight of the animals. The results were confirmed by autopsies on the dogs treated. *A. caninum* was reduced by 96.8 per cent, *Toxocara canis* was completely eliminated after a single dose, *Trichuris vulpis* reduced by 77.3 per cent. There was no evidence of any pathological lesion of the stomach or intestinal mucosa, nor of the liver or kidneys, elimination takes place by the kidneys and the larger bile ducts. H. Harold Scott

GOODLIFFE, F. A. & BLAIR, D. M. Hatching Speed of Schistosome Miracidia. [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1948, Sept v 42, No 2, 205

It is difficult to detect the actual emergence of miracidia of *S. haematobium* from their egg shells and the speed of this would appear to be very great.

The authors in Southern Rhodesia, studied the individual "frames" of a cine film exposed during the act of hatching. An intact egg was found in one frame and an empty split egg shell, with the miracidium a short distance away, was found in the next. The act of emergence must have coincided with the instant when the film was not exposed to the light transmitted through the slide, namely the 1/48th of a second while the shutter was closed. The hatching took place at room temperature (about 72°F). H. J. O'D. Burke-Gaffney

SHORT, R. B. Hermaphrodites in a Puerto Rican Strain of *Schistosoma mansoni*. *J Parasitology* 1948, June, v 34, No 3, 240-42, 1 fig

Short records the finding of 13 hermaphroditic males of *S. mansoni* out of 35 which he examined. The worms were collected in Porto Rico, but the host is unknown. The female reproductive system in some of the specimens was more completely formed than in those described by VOGEL [this *Bulletin*, 1948, v 45, 93], whose examples appeared to lack vitelline ducts, oötype, Mehlis' gland or a female genital pore. Some of the Porto Rican specimens possess oviducts, oötype, Mehlis' gland, short uteri, main vitelline ducts and vitellaria in different stages of completeness, in addition to well developed ovaries. In three specimens a female genital pore is present. Where this is easily visible, the male and female ducts unite at or close to the opening which thus may be regarded as a common genital pore. In one specimen, which is figured, there is a complete set of female organs which, however, are not quite typical and the vitellaria are not well formed. No eggs were present either in the uterus or oötype of any specimens, but in one the vitelline ducts contained a few vitelline cells. The seminal vesicles rarely contained spermatozoa, and these were usually in very small numbers. In four worms, the testes were reduced (in two cases, to three in number). J. J. C. Buckley

PAPIRMEISTER, B. & BANG, F. B. The In Vitro Action of Immune Sera on Cercariae of *Schistosoma mansoni*. *Amer J Hyg* 1948, July, v 48, No 1, 74-80, 4 figs on 1 pl

Using sera from monkeys experimentally infected with either *S. mansoni* or *S. japonicum* and sera from three human patients, each infected with either *S. mansoni*, *S. japonicum* or *S. haematobium*, the authors demonstrated the formation of a precipitate around the cercariae of *S. mansoni* acquired from the snails *Australorbis glabratus*.

Cercariae were exposed, within 1 hour of being concentrated or a maximum of 3 hours after leaving the snails, in a physiological saline suspension and a

1 in 2 dilution of serum. At room temperature the precipitate was formed around the tail of the cercaria in about one hour after which movement became sluggish, and within 3 hours the body was also surrounded. A precipitate was formed with control cercariae in normal sera and these survived longer and in contrast with the cercariae in the immune sera they usually shed their tails. In a very high percentage of the cercariae exposed, the precipitate was formed in both the monkey and human immune sera. The highest titres and most extensive precipitate were produced by two monkeys recently infected with *S. mansoni* and by the recently infected patient (*S. japonicum*). The lowest titres were obtained in 8 monkeys infected with *S. japonicum* which were lightly infected and whose infection was of 2 to 2½ years duration. The sera of only 3 of these 8 monkeys produced precipitate without the addition of guinea-pig complement (unheated guinea-pig serum diluted 1 in 10). Heating the positive sera in a water bath at 56°C. for half an hour destroyed the ability to produce precipitate but the addition of guinea-pig complement restored it in every case.

J J C Buckley

LEVINE, M. D. GARZOLI R. F., KURTZ, R. E. & HILLOUGH J. H. On the Demonstration of Hyaluronidase in Cercariae of *Schistosoma mansoni*. *J Parasitology* 1948 Apr., 34 No. 2, 158-61 ? figs.

The fact that hyaluronidase an enzyme capable of disaggregating and depolymerizing hyaluronic acid, has been demonstrated in numerous bacterial organisms and has been shown to be a mechanism whereby these organisms spread in skin, suggested the possibility that this enzyme might well be involved in the mechanism of cercarial penetration of skin. A technique is described in which the hyaluronidase activity of cercariae of *S. mansoni* in suspensions prepared with sodium hyaluronate was tested. Considerable activity was demonstrated, although there was no relationship between the number of cercariae used and the activity.

The authors do not hold that this ability of *S. mansoni* cercariae is entirely responsible for the phenomenon of cercarial penetration and remark that collagenase or proteolytic enzymes might also be present but these have not yet been investigated.

J J C Buckley

GELFAND M. Bilharzial Disease of the Bladder as determined at Autopsy with particular reference to its Diagnosis by Mucosal Snips. *Amer J Trop Med* 1948, July & Aug. No. 4 563-6.

The author classifies the macroscopic lesions of the bladder found at autopsy in *S. haematobium* infections into (1) whitish tubercles varying in number and from 0.5 mm. to 2 mm. in size seen mostly on the fundus (2) greyish-yellow or reddish brown "sandy" patches of similar distribution, but later in appearance and (3) reddish warty papillomata, seen usually in the fundus and apex in about 8 per cent. of cases. It refers to the general impression held by many authorities that macroscopic lesions may be expected if ova are deposited in the bladder and that a normal naked-eye appearance of the bladder excludes schistosomiasis.

In the present study the author in S. Rhodesia, examined the bladder macroscopically at autopsy in 50 consecutive cases of vesical schistosomiasis and then digested each whole bladder in 10 per cent. caustic potash at 60°C. for 10 hours. The centrifuged digest was then examined for ova. (In S. Rhodesia the disease may be considered to be well established by the time adult life is reached—the patients in this case were Africans of 20 to 50 years.)

In the 50 cases, 34 (68 per cent) showed macroscopic lesions, as defined above in 16 (32 per cent) no macroscopic abnormality was found, but ova were detected, on digestion of the specimens. It is thus clear that the bladder may be diseased, even if cystoscopy shows no abnormality.

The author then refers to the work of OTTOLINA & ATENCIO [this *Bulletin*, 1944, v 41, 945 and HERNANDEZ MORALES & MALDONADO [*ibid*, 1947, v 44, 330] on rectal biopsy in the diagnosis of *S. mansoni* infections. He himself has been able to demonstrate positive biopsy snips in most of those passing ova in their stools, he has also been able to diagnose *S. haematobium* by biopsy in about 40 per cent of cases [paper in publication].

He also took snips about 2-3 mm in size from 10 bladders, apparently free from lesions macroscopically. Nine of these were positive for *S. haematobium*. He therefore recommends that should a bladder appear to be normal on cystoscopic examination for evidence of schistosomiasis, a snip of the mucosa should be examined for ova, since the disease cannot otherwise be excluded. [The author refers to a paper by himself in 1947, now under publication but there is no reference to the paper by MEESER, ROSS & BLAIR, also in *S. Rhodesia*, on the diagnosis of rectal schistosomiasis, which includes rectal biopsy (this *Bulletin*, 1948, v 45, 794)]

H J O'D Burke-Gaffney

ERFAN, M. Pulmonary Schistosomiasis. *Trans Roy Soc Trop Med & Hyg* 1948, Sept, v 42, No 2, 109-13 [14 refs]. Discussion 113-16 [MANSON-BAHR, P., TIDY, H., DAY, CHESTERMAN, C C., ALVES, ERFAN]

Lung infection in schistosomiasis occurs early, when the cercariae are migrating, and later if there is lodgement of ova and worms in the lungs. In Egypt, 60 to 70 per cent of the population harbour schistosomes, of these a third suffer from secondary pulmonary schistosomiasis. The disease is one of agricultural workers, its greatest incidence is in children and young adults, males preponderating.

Ova and worms reach the lungs embolically from veins in the urinary or intestinal tracts, they travel by the internal iliac veins, and through the porto-caval anastomoses respectively. *S. haematobium* ova are more commonly found in the lungs than those of *S. mansoni*. The ova cause two types of lesions, parenchymatous and arterial. On escaping from the lung arterioles into the adjacent tissue they are surrounded by histiocytes and eosinophiles, then by lymphocytes and a few giant cells, and fibroblasts finally form a nodular scar. These parenchymatous lesions occur around the bronchioles and alveoli, but cause little change in the finer structure of the lungs. The arterial lesions, usually due to the ova of *S. mansoni*, though less common, are more serious. They are caused by the passage of ova through the arteriolar walls, with scarring and atresia or occlusion of the vessels. Occluded vessels may be canalized, with the formation of angiomatoids. If the vascular lesions are numerous the right ventricle dilates, hypertrophies, and finally fails. In the early stage, miliary bilharzial tubercles can be seen microscopically in clusters, or arranged in lines, around the thickened arteries. Later the tubercles vanish, and only the thickened dilated vessels are to be seen. The pulmonary artery and its primary branches may be greatly dilated, and their walls show atheromatous changes. In their lumina there may be ante-mortem thrombi. The right ventricle is dilated and hypertrophied, its wall being 1 cm or more in thickness. There may be schistosomes in vessels in the lungs though they are harmless when alive, on dying they cause a necrotic focal pneumonia evident, at postmortem as opaque white areas of consolidation 0.1 to 0.5 cm in diameter. The arteriolar involvement gives rise to a condition resembling Wertheim's disease, or primary pulmonary endarteritis, but cyanosis, the most

striking feature of this disease is noticeably absent in pulmonary schistosomiasis until the right ventricle fails. Radiologically, in early cases, the nodules can be seen along the ramifications of the pulmonary artery. Later there is increase in number, the hilar shadows increase, and the subaortic notch is obliterated. In very advanced disease the hilar shadows are further increased, and the pulmonary artery and conus are greatly enlarged, reaching aneurysmal size and marking the aorta. The heart develops the appearance of *cor pulmonale*.

A specific diagnosis of pulmonary schistosomiasis rests on discovery of ova in the sputum but they are rarely found. Establishment of the presence of the primary infection is essential and clinical examination of the lungs is of little help. Clinical and radiological examination of the heart is important. Eosinophilia is more pronounced in cases with lung involvement.

Two per cent. of those suffering from schistosomiasis die from right ventricular failure as a result of pulmonary arterial disease. This failure occurs late, its causation being mechanical rather than myocardial. Treatment with antimony should be given early before there is enlargement of the right ventricle. In cases with right ventricular failure, antimony is contra-indicated. The heart failure is treated along the usual lines with digitalis, venesection, and mercurials.

In the discussion which followed the lecture Sir HENRY TUDY praised the advances made by the Egyptian workers in the study of schistosomiasis during the last 20 years. The recognition of pulmonary and hepatic bilharzial disease was largely due to them. Ayerza's disease, according to the textbooks, is characterized by deep cyanosis due to sclerosis of the pulmonary artery and probably is syphilitic in origin. The best recent description of the pathology of the condition has been given by CHERRY in America. There appears to be no essential difference between his illustrations of the arterial changes and those reproduced from cases of pulmonary schistosomiasis in Egypt. Many cases of Ayerza's disease come from mining areas in high altitudes in S. America. On bringing these patients to low altitudes (such as obtain in Egypt) the cyanosis diminishes. There is no adequate ground for considering syphilis a causative factor in this condition and the name should be restricted to the particular syndrome in S. America, and not be applied to every case of pulmonary arteritis with death in cardiac failure.

The intensive courses of antimony treatment advocated by Blair and Alves should be used with caution. There have been reported some bad reactions in S. Africa and even more severe in Egypt. The S. African patients, apart from their schistosomiasis, were healthy but in Egypt hookworm and other infections are ubiquitous.

Prof. DAY referred to LOOKS's fear that when specific treatment for schistosomiasis was found the resultant verminous thrombophlebitis might be worse for the patient than the parasitic infestation. He had observed a remarkable degree of necrosis and infiltration around dead worms in the liver, a condition which resembled that depicted in recent papers on filariasis. Similar reactions may well occur in the lungs. The proportions of cases of lung involvement due respectively to embolism of ova and to actual worm infestations have yet to be decided. A pulsating shadow in the hilar region around the heart, if it were to be seen on screening and were due to incompetence of the pulmonary valves might be of diagnostic significance.

Dr. C. C. CRESTHORN referred to the complications, including pulmonary symptoms due to *S. intercalatum* infestations to which he drew attention 25 years ago. He agreed with the opinion that there are possible dangers in too energetic treatment with tartar emetic for example pulmonary tuberculosis may be activated.

Mr ALVES stated that after concentration with KOH very scanty ova in the sputum may be revealed. There may be racial differences in the susceptibilities of Bantu and Egyptian to antimony, but schistosomiasis in Egypt is clinically a much more severe disease than elsewhere in Africa. The radiological recognition of pulmonary schistosomiasis in S Rhodesia is complicated by the prevalence of silicosis and tuberculosis, both of which it resembles.

Prof ERFAN in reply said that the intensive antimony treatment in Egypt produces severe, and often serious, general reactions. He agreed with DAY that hilar pulsations may be seen in cases of interatrial septal defect, but they are not marked in bilharzial pulmonary arterial disease as the vessels are atheromatous and rigid.

A R D Adams

HASHEM M. The Incidence of Non-Schistosomal Forms of Hepatic Cirrhosis in Egypt. Their Morphology and Pathogenesis. *J Roy Egyptian Med Ass* 1948, Mar-July & Aug, v 31, Nos 3, 7 & 8, 222-9, 541-55, 635-50, 17 figs on 9 pls [32 refs]

MAUSS H. Ueber basisch substituierte Xanthon- und Thioxanthon-Abkömmlinge. Miracid, ein neues Chemotherapeuticum [Miracid, a New Chemotherapeutic Agent]. *Chem Berichte* 1948, Jan, v 81, No 1, 19-31 [Refs in footnotes]

CAWSTON, F G. Criteria of the Cure of "Bilharziasis". *J Trop Med & Hyg* 1948, Sept, v 51, No 9, 184

The author lists certain points to be observed in assessing cure of schistosomiasis [though not giving much clinical or any statistical evidence in support of them]. Failure to hatch is no evidence that female adult worms are dead and treatment should be continued for a week after ova have ceased to appear. If total dosage is inadequate, ova tend to reappear at the end of six weeks.

The author has cured a case in 22 days with a total of 50 cc of anthiomaline in doses up to 4 cc intravenously five times a week, without causing more than the slightest cough. He considers this to be a minimum period of cure.

Degeneration of adult worms may be estimated by the gradually increasing proportion of dead and degenerating ova in the excreta, after 10 days. The first sign of drug effect is a slightly increased transparency of the egg shells, associated with increased activity of the contained miracidia or the presence of ill-formed ones. It is stated that some ova later are seen to be black without trace of a miracidium, especially where antimony or benzoic acid is being administered. This the author attributes to the entry of blood through the egg shells damaged by the drug. A further indication of the death of the adult worms is a temporary rise in the eosinophile count a few days after the start of treatment; this nearly always returns to normal two months after the death of all the adult parasites.

J H O'D Burke-Gaffney

FAUST, E C & BONNE, C. Mammalian Blood Flukes of Celebes. *J Parasitology* 1948, Apr, v 34, No 2, 124-31, 12 figs [14 refs]

The circumstances of the discovery of a focus of *Schistosoma japonicum* and of *Echinostoma lindoensis* in 1936 in the Lake Lindoe region of the Celebes [this *Bulletin*, 1938, v 35, 218] are reviewed by the authors. In the present communication the earlier data are amplified and more detailed morphological facts are presented. In the advanced stages, schistosomiasis in the inhabitants of Lake Lindoe villages presents the classical clinical picture of splenomegaly, hepatic cirrhosis, ascites and emaciation. Adult worms obtained from human, canine and cervine hosts were examined in detail and shown to be morphologically identical with *S japonicum*. A collection of snails made in the Lake Lindoe region contained no *Oncomelania*.

Reference is also made to an expedition in 1941 to Lake Po-o 100 kilometres to the south-east of Lake Lindoe [this *Bulletin* 1947 v 39 628, 629]. No human, or animal infections with schistosomes were found there nor were any snails of the genus *Oncomelania* discovered, but from a single specimen of *Lymnaea* sp. furcocercous cercariae were obtained. The morphology of these is described and also that of immature flukes obtained as a result of exposing rats and mice to the cercariae. Although these worms are believed to belong to the genus *Schistosoma* rather than *Schistosomatium*, it is concluded that they are not *S. japonicum*.

J. J. C. Buckley

LI, Fu Ching Zur Frage der Schistosomiasis Japonica und ihrer Bekämpfung in China. [*Schistosomiasis japonica* and the combating of it in China.] *Chinese Rev. Trop. Med.* 1948, Jan. v 1 No. 1 15-28 2 figs. (1 folding) (23 refs.)

This article is divided into three main sections. The first speaks of the worm itself its discovery, life-history and its presence in China. The second of its epidemiology in China, especially in Kiangsu and Chekiang provinces and in 9 districts, but hardly any figures are given merely averages and extremes for certain areas and sub-districts and the same for the percentages of infected *Oncomelania* found, varying from 1 to 16 the totals examined on which these percentages are based are rarely stated.

Among 37 districts more than half the people are infected (55.6 per cent) in the heavily infected and as much as 39.6 per cent, in the more lightly infected. Of over 12 million inhabitants of these districts 80 per cent, are peasants and 47.4 per cent, of them suffer from schistosomiasis a much higher proportion than in Japan itself where the author states, among 1½ million persons (where?) only 5.3 per cent, are infected. As regards sex the inferences drawn have little validity because the numbers are small of 423 adult males, 153 were infected (36.1 per cent.) of 86 women 12 (14 per cent.) of 81 boys 18, and of 19 girls 5 were infected also the figures of the females are erroneous.

from modesty" they are averse to consulting a doctor. The third section deals with the measures to combat the disease. These are on the usual lines drying the canals to kill the snail vector the use of toxic substances in the water proper provision for excreta disposal, treatment of patients and explanatory propaganda among the people.

H. Harold Scott

PITNER G. McNAMARA W. L. & GODDARD F. M. Parasitologic Studies of World War II Veterans, with special references to Schistosomiasis Japonica. *Amer. J. Clin. Path.* 1948 Aug., v 18 No. 8, 833-4

In order to detect asymptomatic and sub-clinical schistosomiasis the stools of 130 patients in a Veterans Administration hospital who had definite histories of exposure to fresh inland water in an area endemic for schistosomiasis (*japonicum*) were examined repeatedly by five different methods, namely —

- (1) Direct smear pieces of mucus being selected if possible
- (2) Acid-ether concentration technique
- (3) Sedimentation after comminution in 25 parts of 0.5 per cent. glycena in tap water and filtration through wet gauze the process being repeated several times.
- (4) Egg hatching technique with examination for miracidia with a hand lens.
- (5) Combined screening and sedimentation technique by filtration through 100-mesh wire cloth (opening 150µ) and then through 400-mesh (openings 37µ)

In addition, Faust's zinc sulphate centrifugal flotation method for protozoa and other ova was used as a routine

The findings were as follows — *Schistosoma japonicum* ova were found in 5 patients, hookworm ova in 44, *Trichuris trichiura* ova in 34, *Ascaris* ova in 3, *Hymenolepis nana* ova in 1, *Trichostrongylus* ova in 3, *Strongyloides* larvae in 1 and *Entamoeba histolytica* in 18

L E Napier

TARR, L Effect of the Antimony Compounds, Fouadin and Tartar Emetic, on the Electrocardiogram of Man, a Study of the Changes encountered in 141 Patients treated for Schistosomiasis *Ann Intern Med* 1947, Dec, v 27, No 6, 970-88, 5 figs [13 refs]

Heart failure and death have been reported as a result of trivalent antimony injections, but no significant electrocardiographic changes had been reported prior to MAINZER and KRAUSE's paper [this *Bulletin*, 1940, v 37, 487]

The present study was made on a series of 200 patients with schistosomiasis (*japonicum*), service men infected in Leyte. A preliminary report on 66 of these cases has already been published [this *Bulletin*, 1946, v 43, 657] "The first 141 patients to be treated form the basis of this report" The readings were taken under standard conditions, one hour after an injection, at different times during the course of injections, e.g., after 5 ml, 45 ml, 65 ml, 80 ml, 105 ml, of 6.0 per cent fouadin and after 80 ml, 248 ml and 320 ml of 0.5 per cent tartar emetic, but some variations were made and additional readings were taken in special cases. With the preliminary controls, a total of 900 electrocardiograms were taken and read by one observer.

The alterations were for the most part confined to the T-waves. Changes were observed in 133 patients of whom 98 per cent showed involvement of 3 or 4 leads. Three-plus or four-plus changes occurred in 4 of 48 patients on fouadin and in 30 of 98 patients on tartar emetic. These changes were defined by the author as follows —

"Three plus change was a continued decrease in the height of the T-waves to extremely low voltage or isoelectric levels in three or more leads, accompanied by a slight negativity of the terminal portion in one or more of the leads. The summits of the waves presented no sharp angles, but were rounded or flattened."

"Four plus change represented an alteration from positive T-waves to sharply negative or even cove plane T-waves in three or more leads, with low voltage in the remaining lead."

Generally, the changes varied in degree with the total dosage, but there were considerable individual variations, in some cases changes were noted after minimal dosages, whereas in others no changes were noted with large dosages. If however an alteration was noted early in the course, this alteration either remained throughout or more usually was intensified. Four-plus alterations were noted after 176 ml, 200 ml, 320 ml or 416 ml of tartar emetic and after 80 ml of fouadin. Greater alterations were observed after tartar emetic than after fouadin, but the alterations were of the same nature. Some change was noted in every patient with the former drug.

When a second course of injections was given the alterations occurred again and were usually of the same degree. Further, if a tartar emetic course was given after an initial fouadin course, the alterations were of the same degree or were intensified.

The changes were reversible. After the completion of the course they increased in some cases for a few days and then decreased steadily and were absent 30 to 60 days later in 90 per cent of cases, in the remaining 10 per cent. minimal alterations still remained.

The changes in their most marked form might have been interpreted as showing evidence of myocardial degeneration. There was in no case any clinical evidence of cardiac dysfunction.

The author concluded that the alteration was brought about by the deposits of antimony in the heart muscle. "The changes induced were of such definite and distinct pattern that in the more marked alterations they may, within the limitation of our present knowledge be recognised as a specific effect of antimony"

L. E. Nafie

OLSEN, O. W. Wild Rabbits as Reservoir Hosts of the Common Liver Fluke, *Fasciola hepatica* in Southern Texas. *J. Parasitology* 1948 Apr v 34 No. 2, 119-23 [18 refs.]

For the purpose of estimating the importance of wild rabbits as natural disseminators of the common liver fluke post mortem examinations were carried out on 309 jack rabbits *Lepus californicus merriami* and 24 cottontails, *Sylvilagus floridanus* subsp. which were collected in the Gulf Coast region of Texas. Infection with *Fasciola hepatica* was found in 32 per cent. of the jack-rabbits and in 20.8 per cent. of the cottontails. The flukes were usually located in the common bile duct where they caused extreme hypertrophy of the duct walls, resulting in extensive malformation. The number of flukes in the jack-rabbits ranged from 1 to 7 per animal. 3 flukes were found in one cottontail.

The literature dealing with records of *F. hepatica* in rabbits and hares is reviewed and the rôle played by these animals in maintaining the infection and disseminating it to domestic ruminants is discussed.

J. J. C. Buckley

DA FONSECA, F. & DE AZEVEDO, J. F. Um caso humano de fasciolose hepática [A Human Case of *Fasciola hepatica* Infection.] *Ana. Parasit. Hum. et Comparat.* 1948 v 23 Nos 1/2, 18-22.

The authors discuss the world incidence of *Fasciola hepatica* infections in man and quote a number of figures taken from the literature. They are not aware of any reported cases of this infection in continental Portugal or its neighbouring islands [but cases have recently been described from Spain see this *Bulletin* 1948 v 45 197]. They then describe in detail the case of a man of 31 born and bred in Funchal, Madeira, who had paid his first visit to the mainland in November 1947. He then gave a history of one year's gastrointestinal disturbances with loose stools twice daily, backache, malaise, night sweats and abdominal fulness. On examination, the abdomen proved to be full and tender especially along the course of the colon. The liver was a little hard and tender and the spleen was enlarged. The blood picture showed a persistent eosinophilia of 34 to 50 per cent. On the ninth day of observation the patient developed an urticarial eruption on the hand, neck and abdomen. Laboratory examinations were largely uninformative except that in the stools *E. histolytica* (vegetative forms) were found, together with eggs of *Fasciola hepatica*, *Ascaris lumbricoides* and *Trichuris trichiura*. The first named eggs were also found in specimens of bile.

Diagnosis was first suggested by the eosinophilia, which led to the finding of the ova in the stool and bile. The eggs were morphologically typical.

The patient was given to the frequent consumption of raw watercress and lettuce and it is presumed that the former was the likely vehicle of infection.

with metacercariae. This aquatic plant is eaten frequently by the people of Madeira, so that more cases of this infection may arise. The authors consider that a thorough investigation of this question should be made.

They are attempting to establish the complete developmental cycle of the fluke from the eggs passed in the stools and will publish their findings later.

Treatment with emetine has been given, in order to deal with the amoebic infection also. The authors are awaiting the results of this treatment. [Although there is no doubt of the infestation in this case, the question of chemical infection is masked by the presence of the accompanying *E. histolytica* and two other parasites and this same difficulty will complicate interpretation of the results of emetine treatment.]

H J O'D Burke-Gaffney

CACCIAPUOTI, R. Su di una nuova distomiasi umana in Etiopia [A New Distome found in Man in Ethiopia] *Riv di Biol Colon* Rome 1947, v 8, 111-16, 1 fig. [12 refs.]

The trematode described was found by chance when the author was performing an autopsy on a man from Beghemeder, Italian Ethiopia, in 1941. It was present in small cyst-like nodules the size of a pea or a cherry-stone in the small intestine. The mucosa there was congested. The nodules were firm but elastic with contents of serum, pus and blood and many small distomes. None was found in other parts of the intestine, nor in liver, spleen or lung. Specimens were sent to the Director of the Zoological Institute of the University of Naples, who stated that it was a new species of *Pseudoamphistoma*. The author points out its differences from Luehe's first description of this genus and from the known species *P. truncatum* found in the liver by Vinogradoff, and *P. danubiense* found in a cat by Cuerea in 1913. One marked difference is in its having a smooth cuticle. The testes are very large and the mature worm shows a medial laceration due, it is thought, to the rupture of a cyst containing large numbers of ova, whence they may pass to the intestine and are excreted to infest sweet-water fish and crustacea. For more minute details the original should be consulted.

H Harold Scott

BONNE, C, BRAS, G & LIE KIAN JOE. Five Human Echinostomes in the Malayan Archipelago. *Med Maandblad* Batavia 1948, June 1, No 23, 456-65, 9 figs on 2 pls. [14 refs.]

Echinostome material collected at human autopsies in the Malayan Archipelago before, during and after the war was restudied and five species were recognized. These are described and figured together with notes on their reservoir hosts, life-cycles and transmission.

1 *Euparyphium ilocanum* (Garrison, 1908). Frequently found in the small intestine of mentally abnormal persons in Java and also in normal persons. Over 250 specimens have been collected from a single patient. Main reservoir host, the common field rat, *Rattus rattus brevicaudatus*. First intermediate host, *Anisus convexiusculus*, second intermediate hosts, *Viviparus javanicus*, *V. rudipellis*, *Pala comica*, *Lymnaea rubiginosa*, *Anisus convexiusculus* and *Contradens contradens*.

2 *Echinoparyphium recurvatum* (v Linstow, 1873). Found several times along with the previous species in a rural colony near Batavia. Main reservoir host, *Rattus rattus brevicaudatus*, fowls are also natural hosts. First intermediate host, *Anisus convexiusculus*, second intermediate hosts, *Viviparus javanicus*, *Lymnaea rubiginosa*, *Anisus convexiusculus* and *Contradens contradens*. Feeding experiments gave positive results in pigeons, rats and a cat.

3. *Euparyphium malayanum* (Leiper 1911) In the Malayan Archipelago this has only been met with in Northern Sumatra where 730 specimens were recovered from a 12-year-old Batak girl at post-mortem. Reservoir or intermediate hosts unknown.

4. *Echinostoma revolutum* (Froebel 1897) Seen several times in Java in ducks, fowl and in rats. Twice found as a single specimen in Batavia in post-mortems on Indonesians and 85 specimens were once found in an Indonesian boy of 8 years. First intermediate hosts *Lymnaea rubiginosa* and *Lymnaea convexiuscula* second intermediate hosts *Limporus javanicus* *Palaemon* *Lymnaea rubiginosa* *A. latus* *convexiuscula* *Corbicula striatilis* and other *Cerithium* spp. Feeding experiments positive with pigeons and white rats.

5. *Echinostoma lindoesi* (Sandground & Bonne 1940) Originally described from a heavily-infected tribe on the shores of Lake Lindoe in Central Celebes. In one village 98 per cent of the people were infected. No natural reservoir host has been found, but feeding experiments were positive in rats and in a few cases pigeons and young ducks. First intermediate host *Lymnaea* *lindoesi* Second intermediate hosts *Limporus rubripilis* *Corbicula* *lindoesi* *C. lindoesi* is an important article of diet in the Lake Lindoe villages, where it is cooked in a primitive way.

It is remarked that of the five species occurring in man, only *Echinostoma lindoesi* is specially adapted to the human host: the others are regarded as incidental human parasites whose normal hosts are rats and birds. Regular consumption of snails and mussels is the custom only in the poorer districts where the cooking process is not very thorough. [See also this Bulletin 1947 v 37 491 1948, v 39 629 1947 v 44 1013.]

J J C Buckley

GALLIARD H. Infestation naturelle des batraciens et reptiles par les larves plérocercoides de *Diphyllobothrium mansoni* au Tonkin. [Natural Infestation of Amphibians and Reptiles by Plerocercoid Larvae of *Diphyllobothrium mansoni* in Tonking.] 4 n. *Parasit Humaine et Comparée* 1945, v 21, Nos. 1/2, 23-8.

Sparganosis or infection with plerocercoid larvae of *Diphyllobothrium mansoni* occurs in mammals, birds, reptiles and amphibians in Indo-China. The author investigated the incidence and intensity of the infection in the more commonly infected animals in Tonking. *Rana tigrina* has the highest incidence of 60 per cent. (annual mean) and the infection has a seasonal variation. It is nearly absent in winter, strong in spring and intense in summer. The reason for this is not quite clear. The average number of plerocercoids is 20 per animal in the summer. In November and December it varies from 1 to 4 and in March from 2 to 6. The commonest site of infection is the thigh muscles which is the exclusive site in light infections. The abdominal wall comes next in importance and with increasing numbers of parasites the thorax and back are infected. Visceral infection was encountered only once and on one occasion the parasites were encysted but still viable.

Rana maculata is the commonest amphibian host after *R. tigrina* but its infection is usually light, varying from 2 to 6 parasites. *R. maculata* was not found infected and *B. f. melanostictus* only once out of 116 examined.

Amongst the reptiles, 15 out of 15 *T. opisthotus pictus* were found infected, the parasites being numerous under the skin and in the mesentery. Up to 80 parasites have been found in one animal. On the other hand *Hypsiglena* *melanostictus* is rarely infected.

J J C Buckley

DESCHIENS, R & BABLET, J Sur deux cas d'enclavement appendiculaire d'anneaux de cestodes [Tapeworm Proglottids in the Appendix an Account of Two Cases] *Acta Tropica* Basle 1948, v 5, No 3, 219-27, 4 figs

The English summary appended to the paper is as follows —

"The study of nine cases of acute appendicitis from natives in French Tropical Africa enabled the authors to demonstrate, in two cases, the presence of proglottids of *Taenia saginata*

"The parasites were enclosed within the lumen of the appendix. It has been found possible to identify them on sections by their characteristic anatomy, and especially by the presence of chalk bodies in the peripheral parenchyma of the worms. The walls of the appendix were inflamed, as also the lymphatic follicles, the latter being on the point of becoming necrotic

"The proglottids appear to have penetrated directly into the appendix, thus assuming the role of an enclosed foreign body"

EPSTEIN, E Intra-Ocular Cysticercosis Report of a Case *South African Med J* 1948 Oct 9, v 22 No 19, 625-6, 1 fig

KONSTAM P G Late Recurrence after Marsupialization of Echinococcus Cyst of Liver [Memoranda] *Brit Med J* 1948, Oct 2, 647, 1 fig

SUAREZ MELENDEZ J Quiste hidático calcificado de hígado Formas fistulizadas [Calcified Hydatid Cyst of the Liver, with Fistula] *Arch Uruguayos de Med Cirug y Especialidades* 1947, Sept, v 31 No 3, 157-62

VIGIL E, PIÑEYRUA J & DIEZ, R Hidatidosis cardiopericardica [Cardio-pericardial Hydatid] *Arch Uruguayos de Med, Cirug y Especialidades* 1948 Oct, v 31 No 4, 249-60 6 figs

LARGHERO YBARZ, P Quiste hidático del pulmón 40 observaciones personales [Forty Cases of Pulmonary Hydatid Cyst] *Arch Uruguayos de Med, Cirug y Especialidades* 1943 Mar v 22, No 3, 255-68

CRUSZ, H On an English Case of an Intramedullary Spinal Coenurus in Man, with some Remarks on the Identity of *Coenurus* spp Infesting Man *J Helminthology* 1948, v 22, No 2, 73-6, 1 fig & 1 pl

This paper comprises a description and discussion of a coenurus which was removed from the spinal cord of a 14-year-old girl who had developed symptoms of paraplegia. The infection must have been incurred in Britain, probably in Wales during the period 1943-1945. From a reconstruction of the original appearance of the coenurus, which had been cut up after removal into 3 fragments, it is described as follows — a distinctly trilobed vesicle containing 31 scolices, the largest lobe of about 1 cm long, containing 26 scolices in groups of 20, 4 and 2, the next, also about 1 cm long, containing 5 scolices, in groups of 3 and 2, and the smallest lobe, 6 mm long, being devoid of scolices. The cyst wall is very delicate and transparent and shows no signs of proliferation. From the morphology of the scolices and the hooks, it is concluded that the coenurus is immature but all the evidence points to its identification as *Coenurus cerebralis*.

The author reviews briefly the previous records and geographical distribution of coenurosis in man, in which 3 species have been implicated, namely, *C. cerebralis*, *C. serialis* and *C. glomeratus*. He comments upon the difficulty of identifying these species and discusses the validity of the different criteria,

morphological and otherwise which have been employed by various authors separating the species. The possibility is stressed that the coenuri of *m.* may be all one and the same species namely *C. cerebral* that *C. tenuis* may be merely a variety or physiological "strain" and that *C. glomeratus* may represent an immature form of *C. cerebralis*. [See also this Bulletin 1947 v 39 631]

J J C Buckle

OSIDMAN J J. Parasitismo humano por *Dipylidium caninum* (Linneo 1758) [A Human Infestation with *Dipylidium caninum*.] Arch. Uruguaya Med. Ciruj. y Especialidades, 1946 Aug v 29 No. 2, 171-6.

The English summary appended to the paper is as follows —

History is reported of an infant 8 months old parasitised by *Dipylidium caninum* (Linneo 1758) apparently without symptoms. The worm is evacuated by means of oral administration of both garlic and castor-oil. Considering the form of observation the share of each remedy in the success of the treatment cannot be determined.

BERGERET C. Quelques réflexions sur l'anquilostomiase. [Some Observations on Ankylostomiasis.] Bull. Méd. de l'Afrique Occidentale Française 1947 v 4 No. 2, 159-66.

The author considers that the ancylostome occupies a position of its own among the intestinal helminths on account of the organic disorders which it produces directly by the toxic secretions and indirectly by the grave anaemia which is associated with it.

He draws attention to —

- 1 The gross cardiac anaemia which causes dilatation associated with valvular bruits and true asystoles [véritables arythmies]. Histologically there is parenchymatous myocarditis with hyperplasia and fatty degeneration of the fibres and diffuse interstitial infiltration by lymphocytes, polymorphonuclears and fibrocytes.
- 2 The hepatic lesions—centrilobular and midzonal atrophic or fatty degeneration contrasting with dilatation and congestion of the sinusoids in the periportal region and hypertrophy of the Kupfer's cells with melanin-pigment—which are characteristically those associated with anaemia.
- 3 The importance of the haemoglobin factor and the fact that even without dislodging the parasite—often a difficult task—it is possible to ameliorate the anaemia to a great extent by large doses of iron. L. E. 3 after

FLOCH, H. & CAM IN R. Sur un nouveau cas de pseudo-mylome rampante à localisation en Guyane française. [A New Case of Creeping Erythema caused by *Ancylostoma brasiliense* in French Guiana.] J. Méd. Faculté de la Guyane et Territoire de l'Inini. Publication N° 165 1948 F b 4 pp. 3 figs.

CROFTON H. D. The Ecology of Immature Phases of Trichostrongyle Nematodes. I. The Vertical Distribution of Infective Larvae of *Trichostrongylus reticulatus* in relation to their Habitat. Parasitology 1945 [1946] v 39 No. 1/2, 17-25 8 figs. [14 refs.]

CROFTON H. D. The Ecology of Immature Phases of Trichostrongyle Nematodes. II The Effect of Climatic Factors on the Availability of the Infective Larvae of *Trichostrongylus reticulatus* to the Host. Parasitology 1946 [1947] v 39 No. 1/2, 25-36 8 figs. [21 refs.]

HOAT, O D Iets over de overbrengers van de *microfilaria malayi* in het geneeskundig ressort Boven Mahakam [*Vectors of Microfilaria malayi in Upper Mahakam*] *Geneesk Tijdschr v Nederl-Indië* 1942, Feb 17, v 82, No 7, 302-6, 4 figs on 1 pl

The English summary appended to the paper is as follows —

"*Mansonia longipalpis*, *Mansonia annulatus* and *Mansonia indiana* already known as vectors for *filaria malayi* in other parts of the Netherlands-East-Indies were proved to be responsible for the presence of filariasis *malayi* in the Upper Mahakam district of Borneo. A new carrier could be added *Coquillettidia crassipes*, in which under experimental conditions a 26 per cent proboscis infection could be obtained. Larvae of *Mansonia*s and *Coquillettidia*'s can be found attached to the roots of *Eichhornia crassipes*, but also of other kinds of swamp-plants with fluttering roots *Ipomoea reptans* Poir (kangkong), *Hygrophyla spec*, *Sparganophorus vaillantii* Crantz."

GALLIARD, H & NGU, D V Recherches sur la filariose. Choix d'une technique de numération des microfilaries du sang [*Choice of Technique for enumerating Microfilariae in the Blood*] *Ann Parasit Humaine et Comparée* 1947, v 22, Nos 3/4, 158-63

In endeavouring to discover the optimum procedure for estimating the number of microfilariae in blood, the authors established the following points —

- 1 It is immaterial whether the blood be taken from the finger or the ear
- 2 Peripheral blood is slightly richer in microfilariae than is blood taken from a vein
- 3 Microfilarial counts in a large volume of blood are no more accurate than in a small quantity
- 4 Microfilarial counts of haemolysed blood in a moist chamber gave better results than with thick stained films

J J C Buckley

HARTZ, P H & VAN DER SAR, A Tropical Eosinophilia in Filariasis. Occurrence of Radiating Processes about Microfilariae. *Amer J Clin Path* 1948, Aug, v 18, No 8, 637-44, 4 figs [19 refs]

Enlarged lymph glands were removed from the anterior axillary fold of a woman, a native of Curacao. On gross section they were greyish red and showed numerous small yellow spots. On microscopic section, the general architecture of the gland was seen to be preserved. The lymphocytes in the lymphoid tissue were almost completely replaced by plasma cells between which were eosinophils in varying numbers. The yellow spots were areas of infiltration by eosinophils. These were seen in both cortex and medulla. The cells in the centre of these infiltrates were sometimes degenerated, but retained their eosinophilic character. The only other cells present were histiocytes with pale vesicular nuclei. Large numbers of eosinophils were present in the local blood vessels.

In many of the eosinophil infiltrates typical microfilariae were found. Many of these were surrounded by a homogeneous acidophilic membrane from which pseudopodic processes of various shapes and thicknesses radiated, these were also acidophilic and "sometimes fairly refractile". Neither the membrane nor the processes stained with Weigert's fibrin stain.

A leucocyte count showed a total of 20,100 per cmm with 23 per cent eosinophils, 66 per cent neutrophils, 4 per cent lymphocytes and 7 per cent monocytes. No microfilariae were found in the blood. A diagnosis of tropical eosinophilia was made. The patient was given two injections of mapharsen.

Five months later the leucocyte count was 11,300 with 4 per cent. eosinophils. She had no subjective symptoms and roentgenograms of the chest showed no abnormality.

The authors had observed these radiate formations and local eosinophilic infiltrations in other instances of nematode infection for example in a case of filarial epididymo-orchitis and in strongyloidiasis. In both instances the worms were necrosing in the tissues. They consider that it is a non-specific allergic phenomenon in a sensitized person.

L. E. Nafis

OLIVIER G. Etude critique des données nouvelles sur l'éléphantiasis.
[Critical Study of New Data concerning Elephantiasis.] *Méd. Trop.*
Marseille. 1947 Nov-Dec. v 7 No. 5 439-64 9 figs. [64 refs.]

The author discussed the mechanism of the production of elephantiasis using data of his own and of his colleagues.

An analysis of the oedema fluid and blood serum in elephantiasis showed that the protein content of the former was rather lower than one would expect in an inflammatory exudate and that in both the calcium was high. Further studies showed that it was mainly in the oedematous cases of elephantiasis that the serum calcium was high (mean 10.73 mgm. per cent.)

Whereas the serum calcium was normal in the sclerodermatous cases, analysis of the calcium content of the sclerodermatous skin showed that the average calcium content was increased by 83 per cent. These observations suggest that the fibrosis in the skin is due to impregnation with calcium.

The author points out that in the early stages when there is inflammatory oedema and sometimes osteoporosis the blood calcium is high whereas later when scleroderma has developed there is often subjacent ossification and the serum calcium has returned to normal. He therefore believes that disturbance in calcium metabolism is a secondary phenomenon.

Lymphography of elephantoid limbs has confirmed the fact that there is dilatation and stasis in the lymph vessels of the limb but has given no indication if this stasis is mechanical or functional, or whether the cause is regional or general further it has not actually been demonstrated that the obstruction is in the glands though it is generally assumed that it is there. Phlebographic studies have shown that there is some associated venous congestion.

Sympathectomy produces a marked reduction in the size of the limb. This indicates that there is a functional element (spasm) as well as obstruction in elephantiasis. Parathyroidectomy causes a fall in blood calcium and has a transitory effect on the limb in one case it caused a reduction in the size of the limb but the tissues became hard and resistant.

In conclusion the author considers that the mechanism of the production of oedema has still to be demonstrated before any effective treatment can be devised.

L. E. Nafis

THETFORD N D OTTO, G F BROWN H W & MAREN T H. The Use of a Phenyl Arsenoxide in the Treatment of *Wuchereria bancrofti* Infection.
Amer J Trop Med 1948 Jul 28 v 4 577-83 13 ref 1

The substituted phenyl arsenoxides, a new group have markedly lethal action against the microfilariae of *Dirofilaria immitis* and *Leishmania canis* *in vitro* and several of them kill the adult filariae when given in well tolerated doses to their hosts. Arsenamide (i.e. *p*-(bis-(carboxymethyl-mercapto) aryl)-benzamide) kills all the adult worms of *D. immitis* when given intravenously in daily doses of 0.23 mgm. A per kilogramme for two weeks but does not produce an immediate reduction in the microfilaria count.

Seven patients with *W. bancrofti* infection were treated with this drug. It was given intravenously as a sodium salt in a 2 per cent solution in buffered phosphate (pH 7.0) in daily doses of 0.05 ml per kilogramme body-weight (=10 mgm of arsenamide or 0.2 mgm of As) for 15 days. Microfilaria counts were made before, during, and after treatment, the last counts being taken from 12 to 17 months after treatment. In six cases the pre-treatment counts were respectively, 307, 4, 726, 19, 150 and 143 microfilariae in 0.1 ml of night blood. In each case, the microfilariae were practically eliminated by the end of treatment. In 3 cases very small numbers (1 to 3) were found during the follow-up, in one of these as late as the 17th month, but in all except this one the final count showed none. The treatment caused signs of slight toxicity in three cases, and febrile or local reactions in 4 others, the latter were probably due to the death of the adult worms.

In the 7th case no microfilariae were found at any time but the patient had overt signs of filariasis, and gave a positive skin test with *dirofilaria* antigen. After treatment there was a temporary improvement in the scrotal oedema, and the eosinophil percentage which had risen from 4 to 16 during treatment fell to nil in 100 white cells.

Two patients were treated with mapharsen (oxyphenarsine hydrochloride), one, an adult male negro aged 28, was given 0.06 gm doses daily for 10 days.

The microfilaria count fell from 360 in 0.1 ml during the day and 14 during the night (he was a night worker) to nil two and three weeks after treatment. The other, a 23-year-old Porto Rican, was given 1.0 gm by the constant drip method over a period of 5 days. His count fell from 4 to 5 microfilariae "per drop of freshly drawn night blood" to nil immediately after treatment and again in 3 and 28 months. In this second case, however, an adult filaria was removed by biopsy at the time the treatment was given.

The authors point out that the past failures with arsenical drugs have been associated with smaller dosages.

L. E. Napier

KERSHAW, W. E. & BERTRAM, D. S. Course of Untreated Infections of *Leishmanosoides carinii* in the Cotton Rat [Correspondence] *Nature* 1948, July 24, 149-50.

The authors urge that caution be used in interpreting the results of chemotherapeutical studies in filariasis, in which the experimental animals employed are cotton rats which have acquired their filarial infections naturally in the field. Their experience with cotton rats experimentally infected in the laboratory and observed for a year or more, shows that the duration and intensity of the microfilariae in the blood varies considerably in different rats, and hence that conclusions from treated infections should not be drawn without due regard to findings in untreated controls.

The general course of the blood infection in rats exposed to infection on one occasion was as follows: microfilariae appear in the blood after 51 days and increase in numbers during the next month or so, after which the number tends to remain more or less constant with wide variations about the mean. But in one rat the intensity was maintained at 140 to 240 microfilariae per cmm for 12 months, while in another the intensity was maintained at 80 to 190 microfilariae per cmm for six months, but dropped progressively during the following 3 or 4 months and finally disappeared. In another series of rats which were infected by mass exposure on several occasions, some showed counts of 1,500, 840, 675, 450 and 140 microfilariae per cmm about the third or fourth month later and after the seventh or eighth months these counts dropped to 530, 45, 30, 10 and 20 respectively, while in other rats which died seven to twelve months after their last exposure, many of the adult worms were dead and encapsulated.

Another important variable is the relationship between the death of the adult worm and the disappearance of the microfilariae from the peripheral blood. The persistence of microfilariae in the peripheral blood in the absence of the adult is known to vary from days to weeks and even months.

J. J. C. Buckler

VARGAS L. Notas sobre la oncocerciasis. VI Consideraciones sobre la biología de las larvas de simúlidos. [Notes on Oncocerciasis. VI On the Biology of Simuliid Larvae.] *Gac. Méd. de México* 1947 Dec. 31 v. 7 No. 6 346-52.

Simulium larvae feed on particles brought down in running water—bacteria, fragments of phanerogam plants, various algae such as *Ulothrix*, *Cladophora*, *Vantheria*, *Coccoloba*, *Euglena*, *Spirogyra*, and diatomaceous copepods, etc. The larvae live preferably in fairly rapid flowing water but not too rapid. The author shows how these factors—the presence of the appropriate food, the character and flow of water, the temperature, protection from winds, etc.—participate to facilitate the adults in the deposition of their ova and the larvae in developing in the different areas of Chiapas, Mexico, in parts of which *Oncocerca* is rife.

H. Harold Scott

FORATTINI, O. P. Considerações clinicas sobre um caso de localizaçáo protuberante do *Trichocephalus trichurus* (Linnaeus 1771) Blanchard 1895. [Clinical Observations on a Case of *Trichocephalus trichurus* Infection of the Appendix.] *Arq. P. Med. Med. Cirurg.* 1946 Nov. 52, No. 5 33-31 2 figs.

WOOD, Fao D. A Critical Review of Pinworm Infection. *J. N. H. Soc. Med. & Surgery* 1948 Aug. v. No. 8 347-57 1 fig. (83 refs.)

A general review and discussion of present knowledge.

PICCOLI Annibale. Contributo alla terapia della oncosiaria nell'infanzia col violetto di genziana. Osservazioni relative a casi trattati in ambiente tropicale. [The Treatment of Enterobiasis in Infants by Gentian Violet.] *Acta Med. Italica* 1948 July, v. 3 Suppl. No. 3 11-20 (37 refs.) English summary.

Much of this article is taken up with records of the prevalence of helminthiasis in different countries. The author then goes on to give an account of the treatment of three groups of patients: (1) Twenty-six prisoners of war 23-45 years of age in Kenya [the title of the paper restricting the observation to infants is not quite correct]; (2) Sixty-four Somali children; (3) Thirty-two "national" [Italian] children. To those of the first group were given gentian violet [preparation not stated] 6 cgm. twice a day during two periods of 8 days, with a week's rest between. The drug was well tolerated, pruritus and soon disappeared and in 25 the ova were no more seen. In the case of the other the ova reappeared after an absence of 30 days. In the second group there were 35 boys and 29 girls, their ages ranging between 7 and 12 years. The symptoms exhibited were marked anorexia, vague abdominal pain, intense nocturnal pruritus and intermittent diarrhoea with much mucus and sometimes with blood. In addition to *Enterobius* *D. phyllo-bulbaceus* ova were common and also *Ceratomyxa* and *Blasphysis*. The mode of administration was 1 cgm. for each year of age, divided into 3 keratin-coated capsules, one after each of the principal meals—three courses of 5 days treatment with interval of 5 days free. Ova were passed in large numbers at first but symptoms cleared up and

at the end of treatment no ova could be found in 61, a month later re-examination showed that 60 were still negative, 4 positive. The age of those of the third group were between 3 and 8 years. In six of the children the disease had persisted for about 2 years. The gentian violet was given in two courses of 5 days, with an interval of the same length and dosage as for group 2, 1 cgm, for each year of age. With both groups calomel ointment was applied locally for the pruritus. During the first 5-day course many worms were passed, after which they disappeared. Faecal examination 20-40 days after cessation of treatment showed 29 cured, three others aged 3, 4 and 7 years, were negative at 20 days but positive again at 40 days. These were subjected to another course of two 5-day treatments and they became negative and were still negative when re-examined after 2 months. Three mothers, aged 25, 28 and 32 years, who were positive, were also successfully treated by this method.

H Harold Scott

THORBORG N B TULINIUS S & ROTH, H. Trichinose paa Grönland [Trichiniasis in Greenland] *Ugeskr f Læger* 1948, May 20, v 110, No 21, 595-602 1 map & 1 fig [34 refs] English summary

SKELLER E. Trichinose i Kutdligssat [Trichiniasis in Kutdligssat, Greenland] *Ibid* 602-7 3 figs English summary

These papers are reviewed in *Bulletin of Hygiene*, 1948, v 23, 687

ROSS, Winifred M. A Note on the Collection of Live Adults of *Trichinella spiralis* *Canadian J Comp Med* 1948, June, v 12, No 6, 152-4, 2 figs

While the separation and collection of encysted larvae of *Trichinella* can easily be accomplished, the collection of living adults in numbers sufficient for the preparation of an experimental test antigen proved a difficult problem which was solved as follows: a rat is killed 5 days after oral administration of infective larvae, having received only water for 24 hours prior to killing. The gut is removed from the level of the duodenum to the caecum and is opened and rinsed in a beaker of warm saline. In a shallow pan of warm saline, the mucosa is stripped off with a glass slide and the muscular part of the gut is discarded after rinsing. The suspension of worms and mucosa in saline is then pipetted on filter paper, through which excess saline passes. The filter paper is then placed face down in a Petri dish of warm saline and the adult worms, stimulated by the heat, detach themselves from the paper and the mucosal shreds and fall to the bottom of the dish. They can be further separated from remaining debris by repeating the process. It is important that the saline be kept warm during the procedure and this is best effected by placing the Petri dish in a sink of gently flowing hot water, producing temperatures of up to 42°C. The technique is illustrated by two line drawings. J J C Buckley

DEFICIENCY DISEASES

CRAWFORD, J N & REID, J A G. Nutritional Disease affecting Canadian Troops held Prisoner of War by the Japanese *Canadian J Res Sect E Med Sci* 1947, Apr, v 25, No 2, 53-85, 2 figs

In Hong Kong, as in other prisoner-of-war camps in the Far East, the effects of malnutrition developed against a background of intercurrent infection and (1401)

excessive physical work. The diet is described in general terms throughout the period of imprisonment it was deficient in calories, fat, animal protein, and vitamins, being worst at the beginning in 1942. The authors have not attempted to estimate the intake of individual nutrients, nor to correlate intake levels with the appearance of the various deficiency states.

The greater part of the report is devoted to a detailed and objective description of the nature, course, and response to treatment of the symptoms and signs of deficiency. Preconceived ideas about aetiology and the rôle of specific vitamins have been scrupulously avoided. The value of the work is further increased by the fact that in some cases it was possible to make follow-up observations after repatriation of the troops to Canada.

The first symptoms to develop were urinary urgency, inefficiency of the sphincter, polyuria, and nycturia (nocturnal polyuria). These first appeared after only a week of imprisonment and continued until 1945. Nearly 100 per cent. of the men were affected. The average urine volume was 8-8 litres in 24 hours. Nycturia was relieved whenever there was an increased intake of meat. The symptoms were worse in cases with gross neurological disturbance.

Next oedema appeared. [The time sequence is to be noted. SUGLAND has described nycturia accompanying famine oedema in Holland and Germany (see *Bulletin of Hygiene* 1949, 1, 24 Jan.) but says nothing about which came first.] Nearly 80 per cent. of the camp population were affected. At first oedema responded well to rest in bed, and dramatically to intramuscular injections of thiamin. After 1942, however, many cases were resistant to thiamin. It is suggested that these may have been caused by protein deficiency.

Cardiac changes such as tachycardia, arrhythmia, and systolic murmurs were common but there was little clinical evidence of cardiac enlargement. In patients with infections cardiac collapse was the common cause of death, and it was estimated that the cardiac age was advanced 20 years. Acute cardiac failure does not seem to have been found in the absence of infection. All the cardiac signs responded to treatment with thiamin.

Neurological changes developed at an early stage. These included paraesthesiae, glove-and-stocking hypoesthesia, calf tenderness, and changes in the deep reflexes. Loss of visual acuity was common, accompanied by contraction of the visual fields and scotomata. When ophthalmoscopic examination became possible optic atrophy was found in some cases. An interesting observation is that although there were no complaints of deafness during the period of imprisonment, audiometric tests made after repatriation showed a diminished perception of high frequency tones.

A serious cause of disability was the condition known as "electric feet." This conformed to the descriptions of painful feet in other P.O.W. camps. There was some evidence of vascular disturbance: the pain was worse at night and was relieved by immersing the feet in water. Gangrene sometimes occurred. There was no response to vitamin B₁, but nicotinic acid in doses of 70 mgm. each day intramuscularly reversed the progress of the syndrome. There has been conflict of opinion and evidence about the efficacy of nicotinic acid in this condition: the authors emphasize that in their cases, because of a probable impairment of absorption, the vitamin was given parenterally. It was noted that subjects of European stock who had been born in Hong Kong and lived all their lives there were much less liable to "painful feet" than the troops from Britain or Canada.

As in other P.O.W. camps scrotal dermatitis and lesions of mucosae were common. Conjunctivitis was sometimes accompanied by corneal ulceration, which responded to treatment with shark-oil. In the autumn of 1942 there was an epidemic of pellagra dermatitis, which cleared up with nicotinic acid.

Swelling of the breast was found in a moderate number of cases. This first appeared in 1942, later became less frequent, and recurred after release and return to European food.

In conclusion, the authors discuss the question of psychological changes. They found no evidence of any specific emotional disturbance, if anything, there was euphoria rather than depression.

J C Waterlow

LANDOR, J V. The Effect of Nutritional Disorders on the Skin and Mucous Membranes as observed in the Civilian Internment Camp, Singapore, during the Japanese Occupation of Malaya. *Brit J Dermat & Syph* 1948, Jan, v 60, No 1, 1-9, 1 fig [13 refs]

Skin affections were very common among internees in the civilian camp in Singapore, especially during the latter two years of the Japanese occupation. Among them were some which appeared to be of nutritional origin.

Nicotinic acid deficiency—Pellagrous dermatitis conformed to classical descriptions. Diarrhoea and mental disorders were not commonly associated [The condition of the tongue is not mentioned]. The condition responded rapidly to nicotinic acid and the mass curative and preventive effect of under-milled rice was very evident.

Riboflavin deficiency—Stomatitis and eczema of the scrotum (oro-genital syndrome) were seen in a number of cases. The condition responded to riboflavin internally when this was available.

Blood blister disease—A large number of patients were seen whose complaints were of multiple superficial blood blisters mainly occurring on the palate or buccal mucosa. These blisters were irregularly associated with other deficiency diseases and no available treatment was found to be effective. The author draws a parallel between this condition and that known in Africa as "onyalai". [There are, however, many points of difference between the two, particularly the severe constitutional disturbance and grave prognosis in onyalai, whereas the blood blister disease in the camps was "in general not a troublesome condition".]

Subcuticular haemorrhages—Petechial or larger haemorrhagic spots appeared in or under the skin particularly on the backs of the hands, legs and thighs. No available treatment proved of value.

Erythema nodosum—36 cases of a disease resembling erythema nodosum were seen during the last year of internment. The association with other nutritional disorders was slight, but it seemed probable that malnutrition was part of the cause.

Sword bean dermatitis—In a few subjects, severe pruritus and eczematous type of dermatitis followed the ingestion of sword bean (*Canavalia ensiformis*).

Dean A Smith

RAMAN, T K. Pellagra in India. *Indian Physician* 1948, June, v 7, No 6, 141-72, 22 figs on 4 pls [Numerous refs]

The term "pellagra" is used to describe a variety of conditions. In presenting a clinical study of 102 cases, the author uses the term in its strictest sense: symmetrical exfoliative dermatitis with a sharply demarcated margin was the diagnostic criterion. The cases occurred in Vizagapatam where rice is the dietary staple. The introduction of maize as a common item of diet in 1945 has not been followed by any increased incidence.

It usually occurred on the exposed areas of skin, but it was occasionally found also in unusual situations such as the groins and under the breasts.

Gastro-intestinal symptoms were common and included anorexia and diarrhoea. Gastric analysis showed either greatly diminished acidity or achlorhydria. X-ray examination showed gastric atony. Glucosuria, sometimes present, was not a marked feature. Evidence of associated B complex deficiencies such as angular stomatitis were common and beriberi and hypoproteinaemic oedema co-existed in many cases.

The cerebrospinal fluid was examined in twelve cases and no abnormality was found. Nor was any change attributable to pellagra, detected in the cardiovascular system. Sedimentation rate was normal in cases uncomplicated by other diseases. Fat analysis of the stools indicated defect in both digestion and absorption.

Treatment by means of a full diet, crude liver extract and nicotinic acid produced rapid improvement in the majority of cases. The paper is illustrated with some good photographs of pellagrous skin lesions.

(In the discussion of the aetiology of pellagra almost all important recent work is quoted but the exposition is less lucid than that of the clinical study and does not greatly clarify a complex subject.)

DAVID A. SMITH

DE PAIVA, B. H. C. Modificações electrocardiográficas na pelagra. [Electrocardiographic Changes in Pellagra.] *Rev. Brasileira Med.* Rio de Janeiro, 1948, Aug. v. 5, No. 8, 586-8, 2 figs. [10 refs.]

The English summary appended to the paper is as follows —

"The author reports the details of a case of pellagra with electrocardiographic abnormalities with return to normal conditions, after exclusive administration of nicotinic acid. Several authors such as Ashman and Hull, deny the existence of those anomalies stating that those found in similar cases are due to deficiency of thiamine and not of nicotinic acid (even in the case of pellagra). However, care was taken to administer only the latter in doses of 400 mg. p. d. during 10 days—a total of 4 grams.—and a completely normal record was obtained. The principal anomaly was the reversion of T in C13. There are several cases under observation the results of which will be made known in later publication.

CORRILL, V. L., CREDITOR, H. & STEWART, G. E. S. Millet Beer and Peanuts as Protective Foods in Africans. *J. Trop. Med. & Hyg.* 1948, July, v. 51, No. 7, 140-44, 1 graph.

An outbreak of dysentery and deficiency disease occurred among African prisoners of war in the Anglo-Egyptian Sudan who were subsisting on a diet low in calories with millet as the staple. The clinical picture was dominated by the signs and symptoms of pellagra although the ration contained no meat. There were also some cases of scurvy, beriberi and burning feet.

The camp population consisted of two groups, Christians and Moslems. Cases at first occurred only among Christians who had been eating no meat, whereas the Moslems had been receiving 8 oz. a week. After the beginning of the outbreak, a new diet scale was introduced, the meat ration was increased, and millet-beer and peanuts were added to the ration as sources of vitamins. The Moslems refused the beer and thus became a control group for the effects of beer.

In both Christians and Moslems the additions to the diet were followed by an increase in deficiency disease. In the Christians the increase was only temporary whereas in the Moslems it persisted. Thus it is claimed demonstrates the value of millet-beer as a protective food, since the rations were in

respects equal To explain the rise in morbidity, the authors postulate a stimulation of metabolism resulting from an increased caloric intake They suggest that whenever the caloric value of a deficient diet is increased, protective concentrates should be given at the same time, as otherwise marginal deficiency states may be made worse

The lower morbidity in the Christian beer-drinkers is in agreement with earlier observations of one of the authors He found that among the Sudanese the "burning feet" syndrome affected mainly those who did not drink millet beer, and that it did not occur in tribes eating peanuts

[The suggestion that vitamin concentrates should be given when the caloric value of an inadequate diet is increased, if taken in a general sense, is likely to prove discouraging to workers in the field, since these concentrates are often difficult to obtain The commonly accepted view is that, except in the case of those who are actually ill, the aim should be to supplement the diet with natural foods, such as the millet-beer and peanuts used by Dr Corkill and his colleagues Their observations, and the hypothesis put forward to explain them, suggest that such measures are not enough In field work there are many uncontrollable variables, in the reviewer's opinion, the data do not form an adequate basis for a recommendation of such significance From the theoretical point of view, there is no clear-cut evidence that the requirement for any vitamin except thiamin is affected by an increased caloric intake]

J C Waterlow

CORKILL, N L, CREDITOR, H & STEWART, G E S **Millet Beer and Peanuts as Remedial Foods in Polyhypovitaminosis** *J Trop Med & Hyg* 1948, Aug, v 51, No 8, 160-68

The authors have previously described how they used peanuts and beer made from sprouted millet as prophylactic nutritional supplements in a prisoner-of-war camp in the Anglo-Egyptian Sudan [see above] They now describe the effect of giving the same foodstuffs to patients actually suffering from manifestations of deficiency

From a camp population in which there was a considerable incidence of multiple B complex deficiency and of scurvy, 100 men were chosen and divided into five groups Food supplements of beer, peanuts, peanuts and beer, and marmite (of questionable age) were made available to the first four groups respectively while the fifth remained as a control

The progress of each group was recorded by means of scoring the severity of ten physical signs believed to be stigmata of malnutrition On this basis and on that of hospital admissions and deaths, it is clear that the group on both nuts and beer fared best and the controls worst with the groups on nuts alone and on beer alone approximately equal and intermediate

[The difficulties of life and the practice of medicine in a prison camp make the collection of precise data almost impossible The statistical value of the present results is somewhat diminished by three circumstances (1) the questionable validity of the sampling, (2) the provision, simultaneously with the supplements, of a greatly improved basic diet, including 6 oz each of meat and fresh vegetables daily, and (3) the fact that though the supplements were provided the subjects did not always eat all, or even any, of them None the less the results suggest strongly that peanuts and millet beer were valuable supplements to a diet which up to the time of the experiment had consisted predominantly of sorghum, and hastened improvement even when considerable quantities of meat and vegetables were added]

Dean A. Smith

ROYCE, K. Infantile Hepatic Cirrhosis in Jamaica. *Caribbean Med J* 1944
v 10 No. 1/2, 16-48 [5 refs.]

Nearly 300 cases of cirrhosis of the liver in infants and children were seen each year at the Kingston Public Hospital, Jamaica, between 1936 and 1941. This figure indicates the magnitude of the problem, since the population of the whole island is only 1½ millions.

This paper is based on 32 cases. The author's objective has been to do an analysis of case-histories and an enquiry into the patient's social and economic background, to throw some light on the aetiology of the disease. Cirrhosis is found only in the children of the poorer classes. It is commoner in boys than girls. There is no evidence of a hereditary or familial factor. Two points stand out from the case-histories: (i) the patient showed a higher incidence of infections of the chest, gastro-intestinal tract and skin than the normal child population; (ii) the diet estimated qualitatively was in all cases inadequate in protein, vitamins and minerals and adequate only in caloric content.

The age at the time of admission to hospital ranged from 1 month to 8 years. No child was seen before weaning, which took place at an average age of 8 months. After weaning the diet consisted mainly of starch, roots and porridge with small supplements of milk, salt fish, and vegetables. The average age of onset of symptoms was 4 years. The common presenting symptoms were abdominal distension, anorexia, fever and vomiting. On examination ascites was present in all but one case and nearly all had pyrexia and hepatomegaly. Oedema of the legs was present in 6, jaundice in 5 and splenomegaly in only 3. Most of the children were underweight for their age but specific signs of vitamin deficiency were uncommon. The Kahn test was negative and no significant changes were found in urine or stool. The blood showed a moderate anaemia in the majority of cases, a reduction of the albumin:globulin ratio, an increased sedimentation rate and sometimes a mild leucobasophilia. Histological examination of the liver in one fatal case showed strands of fibrous tissue radiating from the portal channel surrounding lobules and cutting across them. Swollen and necrotic parenchymal cells were seen at the periphery of some lobules.

The author was able to follow the course of the disease over a period of 3 years in all but 3 of the 32 cases. Nine recovered and were free from symptoms, 9 showed some recovery but symptoms persisted, 7 died from intercurrent disease and 4 died of progressive hepatic failure within 6 weeks of the onset. All those in hospital received a good mixed diet, some in addition were given liver extract with yeast or iron. Although no precise comparison is claimed, it was felt that liver had a distinctly beneficial effect. Another factor affecting the prognosis was the occurrence of intercurrent infection. This was usually followed by a return of ascites, nausea, and vomiting.

In discussing aetiology the author believes that dietary deficiency alone is not enough to account for this type of cirrhosis, since only a small proportion of children of the same economic status eating similar food, are affected. He suggests that infection, particularly repeated infection, may be the precipitating factor, since it has been shown experimentally that malnutrition increases the susceptibility of the liver to many different kinds of poisons.

[This is the first paper dealing with cirrhosis in the tropics of which the reviewer is aware in which the cases have been followed systematically over a period of years. Dr. Royce does not claim that the data presented give a complete picture of prognosis and incidence. It is possible that many sub-clinical cases occur in which hepatic fibrosis reaches an apparent stationary state as is suggested from the post-mortem studies of DAVIS in East Africa (this Bulletin 1948 v 45 #33). There must presumably be a tendency to

compensation or partial recovery, since, as the present author points out, clinical cirrhosis in adults is not particularly common in Jamaica. One criticism may be raised—it is perhaps unsound to assume the identity of cirrhosis in Jamaica with infantile, so-called biliary, cirrhosis in India, since there are important clinical differences. In the latter, the onset usually occurs at 1–2 years, and the course is more rapid and more uniformly fatal. Splenomegaly and jaundice are present at an early stage.] *J C Waterlow*

SPRUE

CHRISTOFFERSEN N R & HEINTZELMANN F Folinsyreterapi ved leverrefraktaer makrocytaer Sprueanæmi [Macrocytic Anaemia in Sprue, refractory to Liver Treatment, cured with Folic Acid] *Nordisk Med* 1948, Oct 1, v 40 No 40 1779–80 1 fig English summary (6 lines)

Report of a case

FERGUSON, J W & CALDER, E Folic Acid in Non-Tropical Sprue with particular reference to Fat Absorption and Radiological Appearances of the Small Intestines *Glasgow Med J* 1948, Oct, v 29, No 10, 341–56, 13 figs [18 refs]

“The results are reported of an investigation into the effect of folic acid on seven cases of non-tropical sprue

“Of the cases in which the bone marrow was normoblastic, one patient appeared to obtain subjective improvement. In the others, the general condition was unaltered or had deteriorated. There was no evidence of improvement in fat absorption, biochemical findings, blood picture or intestinal pattern in any of the patients

“Of the two patients who were known to have had megaloblastic marrow reaction, one showed clinical and haematological improvement and a return of the intestinal pattern to normal, but the steatorrhoea persisted. In the other there was no apparent clinical or haematological improvement but again there was a striking radiological improvement without improvement in fat absorption”

HAEMATOLOGY

VAN DER MERWE, C F The Blood Picture of Healthy Europeans in South Africa *South African Med J* 1948, Aug 14, v 22, No 15, 482–7, 7 graphs [49 refs]

Blood counts were carried out on 700 healthy Europeans (374 males and 326 females) living in South Africa at heights between 3,000 and 5,500 feet above sea level

The author's figures have been arranged in tabular form

		Approximate range	Extremes
Red cells—10 ⁶ per cmm	Males	5.0 to 6.9	4.0 & 7.8
	Females	4.5 to 6.5	4.0 & 7
Haemoglobin gm. per 100 ml.	Males	16.0 to 1.6	14.4 & 23.2
	Females	15.2 to 20.0	14.4 & 21.6
Mean diam. ters of red cells, μ	Males		7.1 & 7.8
	Females		7.1 & 8.1
Leucocytes per cmm.		4,500 to 11,000	3,500 & 18,000
Eosinophils per 100 leucocytes		1 to 8	0 & 28
Monocytes per 100 leucocytes		0 to 1	— & 20
Lymphocytes per 100 leucocytes		23 to 53	16 & 63
Rod-shaped leucocytes per 100 leucocytes		2 to 20	0 & 28
Polymorphonuclears per 100 leucocytes		30 to 60	23 & 70

For estimating the mean diameters of the red cells he used Fijfer's blood cell tester and for the differential count he counted only 100 leucocytes.

The author concludes that "there exists a much wider range in normal people than is usually assumed. Many supposedly abnormal blood pictures are included in this range. Blood pictures when possible should be compared not with traditional standards but with other blood pictures of the same person."

[The results are shown in a series of carefully-drawn (and well-reproduced) curves and to get the full value of this paper one must refer to these. This is made necessary by the author's failure to apply statistical methods to the figures which he has so laboriously compiled. He has apparently selected entirely arbitrarily what we have interpreted as the range (he has occasionally used the word) for example he writes "Curve I shows that values of approximately 5.0-6.9 million red corpuscles per cmm. were found in 374 healthy males— and "Extreme values of 4.0-7.8 millions for men" were occasionally found." The extreme arbitrariness of his choice of "range" is shown by the fact that from his erythrocyte curve it is apparent that only some half dozen instances at each end of the curve are excluded from his range (5.0 to 6.9 million) whereas he states that 1,137 persons no eosinophils were found (range 1 to 8 per cent.) The application of elementary statistical methods would have increased the value of this paper considerably. From his figures for polymorphonuclears in the text (quoted above) he has apparently excluded "rod-shaped leucocytes" but in curve VII the polymorph (sic) curve extend from 30 to 80 per cent and obviously includes all neutrophil granulocytes.)

L. E. Nafar

FOOTE, E. S. & ELDON, S. Malar insanda rem anem (schizocellanem) erak eritrouth anem). A Case of Sick Cell Anemia in the White. *Türk Tıp Cemiyeti Mecmuası* 1946 AXC I, No. 8. 7 Turkish 251-61. 4 figs English summary 33-40.]

DAVIDSON, L S P **Pteroylglutamic Acid (Folic Acid) Therapeutic Indications and Limitations** *Edinburgh Med J* 1948, July, v 55, No 7, 400-411 [32 refs]

Synthetic folic acid contains the amino acid, glutamic acid, linked with para-aminobenzoic acid and the pteridine nucleus. The name pteroylglutamic acid (PGA) is preferable. In natural foods and tissues it occurs mainly in the form of conjugates, the most important of which is pteroylhaptaglutamic acid or PHGA. These conjugates have been shown by biological assay to be inactive, but, if the additional molecules are removed by hydrolysis, the property of stimulating the test-organisms is regained.

This is of interest because it suggests that the fundamental defect in Addisonian pernicious anaemia is the inability of the patient to utilize PHGA by its conversion to the free form, this can be done *in vitro* by the use of enzymes such as takadiastase and by the action of acids and alkalis, while in the living animal hydrolysis is probably accomplished by the action of a naturally occurring enzyme called Vitamin B₁₂ conjugase found in many organs, such as the liver, kidney and pancreas. Some organs indeed contain also inhibitors of the conjugase system. Biological assay of PGA in foods becomes complicated, so that published reports of the content of PGA vary widely. It is more easily damaged by cooking than other members of the vitamin B₁₂ complex and the process of canning has a deleterious effect. The daily intake by a normal person is less than 1 mgm, though it is possible that this amount may be augmented by the production of PGA by bacterial synthesis in the intestinal tract. This certainly occurs in the rat which can manufacture up to 70 per cent of its daily requirement by this method, so that sulphonamides must be administered in order to produce the PGA deficiency syndrome, but proof that this synthesis occurs in man is not available.

Certain synthetic compounds, such as *d*(-)-methyl folic acid, have an antagonistic action to PGA. This action can be shown by their effect in inhibiting the growth-promoting action on *Lactobacillus casei*, or *Streptococcus faecalis* β . Deficiency syndromes in animals fed on a PGA-deficient diet develop more rapidly and severely when these antagonistic compounds are added to their diet.

Pteroylaspartic acid, though closely related chemically to PGA, is therapeutically ineffective in Addisonian pernicious anaemia and is even antagonistic to PGA, but not to purified liver extract. Sufficient evidence is not yet available to explain the mechanism by which PGA produces its dramatic effects on the haemopoietic and alimentary system, but there is ample evidence to show that PGA is neither Castle's intrinsic or extrinsic factor nor the interaction product which is stored in the liver and is present in purified extracts given parenterally. In the chemical processes employed for the preparation of liver extracts, those fractions which contain PGA are discarded so that the end products are practically devoid of it, but since the haemopoietic effects produced by the daily administration of 1-2 mgm of PGA are indistinguishable from those resulting from a single injection of refined liver extract containing only a few microgrammes of the active anti-anaemic principle, it appears reasonable to believe that their mechanisms of action are closely related. As a working hypothesis it is suggested that the fundamental defect in Addisonian pernicious anaemia is the patient's inability to utilize PHGA; furthermore, that this metabolic error is directly attributable to the patient's inability to produce the active principle present in purified liver extract consequent upon a failure of gastric secretion of Castle's intrinsic factor. Although the mechanism is still obscure, the fact remains that a deficiency of PGA with its haemopoietic syndrome can result from either defective intake, or defective absorption, of PHGA, or from a defective production of the factor present in purified liver extract.

As a member of the vitamin B complex PGA should function according to certain well defined principles which are applicable to vitamins in general. The clinical features characteristic of any particular vitamin deficiency state should appear consistently when a certain stage of deficiency has been reached, but will disappear when the deficiency has been corrected. The clinical features should not respond to the administration of any other substance but the vitamins concerned.

The manifestations of PGA deficiency are concerned with the haemopoietic and alimentary systems. In general it will be found that all types of anaemia with a normoblastic marrow fail to be influenced favourably by PGA.

The intramuscular injection of large quantities of PGA is wasteful and uneconomical for much of the injected material is rapidly excreted in the urine. It is much more effective to give 5 mgm. daily by mouth for thirty days than one single dose of 150 mgm. by mouth or injection.

The daily dose of PGA required for optimal blood regeneration varies from patient to patient. The lowest effective dose recorded is 1 mgm. The maintenance requirements of PGA have not yet been finally established. The author has had cases which maintained a normal blood level on a daily intake of 1.0 and 2.5 mgm. over a period of 255 or 384 days respectively.

However in view of the dangers of developing neurological disease to which attention has been called, maintenance treatment of pernicious anaemia with PGA can no longer be recommended. It had been found that a dose of 10 mgm. PGA daily by mouth is effective in the treatment of megaloblastic anaemia of pregnancy and in the sprue syndrome with megaloblastic anaemia. Spinal puncture when repeated thirty six to forty-eight hours after the administration of PGA to all types of megaloblastic anaemia shows the same remarkable transformation of the bone marrow towards the normoblastic state as had been found in pernicious anaemia treated with parenteral liver extract. In pernicious anaemia of pregnancy in nutritional (tropical) megaloblastic anaemia, megaloblastic anaemia of infants and some cases of the sprue syndrome when once the blood picture has been restored, no further maintenance therapy is required.

In the sprue syndrome the results of treatment with PGA are especially good in tropical sprue particularly with megaloblastic anaemia. In idiopathic steatorrhoea with megaloblastic anaemia responses have been good in some cases, though other workers have had negative results. No benefit appears to occur in the majority of cases of coeliac disease in children. Subacute combined degeneration of the cord is neither prevented nor cured by PGA. More serious still is the statement that PGA actually increases the liability to involvement of the nervous system and accelerates its progress. It has been suggested that PGA interferes with the capacity of nerve cells to use glutamic acid.

It therefore appears that PGA is potentially a dangerous drug and must not be employed except for limited periods and in exceptional circumstances in pernicious anaemia and probably in some other cases. A warning is issued against the practice of polyvalent therapy of the anaemias with iron and liver extract simultaneously until the correct diagnosis has been established.

M. J. W. BAKER

SMITH, T. D. STOVE, R. E., GARCIA LOPEZ, G., MILAVTS, F., LOPEZ TOCA, R. & ARAMBURU, T. Thymine, Folic Acid, and Vitamin B₁₂ in Nutritional Macrocytic Anaemia, Tropical Sprue and Pernicious Anaemia. *Lancet*. 1945 Oct. 2 519-20, 4 figs.

Within the last three years folic acid, thymine or 5-methyl uracil, and vitamin B₁₂ have been found to produce blood regeneration in certain types of

macrocytic anaemia Much work is now being done to elucidate the structure of vitamin B₁₂

The extreme variation in the individual response makes it desirable to observe the effect of folic acid, thymine and vitamin B₁₂ in the same person in the same degree of relapse, under comparable conditions and on the same diet. Three patients were selected, each was admitted to hospital in relapse three times and on each occasion was given a different drug, while the diet and conditions of study were kept constant.

The first case was one of nutritional anaemia in a white man of 51, the second a Cuban farmer, aged 70, with tropical sprue and the third a white man of 46 with pernicious anaemia.

Each compound produced a blood response and a definite clinical improvement. The fact that three distinct chemical compounds have proved effective in each of three distinct clinical syndromes appears to suggest that a great deal can be learnt of the pathogenesis of these diseases.

It appears that several thousand times the weight of thymine is required to produce a response similar to that produced by folic acid, and that several thousand times the weight of folic acid is required to produce a response similar to that produced by vitamin B₁₂. The findings suggest that this last-named is by far the most potent antianaemic substance known. A single dose was injected in the case of each patient and the dosage was 6 µgm, 23 µgm, and 15 µgm, respectively.
P Manson-Bahr

BIRKS, P. H. A Note on the Value of Folic Acid in the Treatment of Macrocytic Anaemia in Assam Tea Garden Labourers [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1948, Sept, v 42, No 2, 203-5

"The results of treatment with folic acid in 20 severe cases of pregnancy or nutritional anaemia are recorded. As judged by European standards, the final results are anything but normal, but they do demonstrate the life-saving properties of folic acid which should be regarded as a specific drug in this difficult and often fatal condition."

VENOMS AND ANTIVENENES

PRADO, A. & HOGE, A. R. Notas ofiológicas 21. Observações sobre serpentes do Peru [Notes on Ophidia 21. Some Observations on Peruvian Snakes] *Mem Inst Butantan* 1947, v 20, 283-95. 4 figs (1 map) on 3 pls. English summary (2 lines).

BÜCHERL, W. Duas novas espécies do genero *Eupalaestrus* Pocock, 1901 [Two New Species of the Genus *Eupalaestrus* Pocock, 1901] *Mem Inst Butantan* 1947 v 20, 297-314. 8 figs (2 coloured) on 4 pls. English summary.

BÜCHERL, W. Estudo comparativo das espécies brasileiras do género *Pamphobeteus* Pocock, 1901 (*Mygalomorphae*) [Comparative Study of the Brazilian Species of the Genus *Pamphobeteus* Pocock, 1901 (*Mygalomorphae*)] *Mem Inst Butantan* 1947 v 20, 233-81, 10 pls. English summary (2 lines).

HOGE, A. Notas erpetológicas 3. Uma nova espécie de *Trimeresurus* [Notes on Herpetology 3. A New Species of *Trimeresurus*] *Mem Inst Butantan* 1947, v. 20, 193-202, 6 figs & 1 chart, English summary.

BIER, O G Estudo quantitativo da reação de floculação entre o antiveneno crotálico e uma fração purificada do veneno da Cascavel neotropical (*Crotalus t. terrificus*). [Quantitative Studies of the Flocculation Reaction between the Crotalic Antivenom and a Purified Fraction of the Neotropical Rattlesnake Venom (*Crotalus t. terrificus*)] *Mem. Inst. Butantan* 1947 v 20 31-7 1 graph.

The English summary appended to the paper is as follows:—

"1 By using a purified, electrophoretically homogeneous fraction from the venom of *Crotalus t. terrificus* it has been possible to make a direct evaluation of the combining ratios between venom and antivenom.

"2 As expected from the molecular weight of crotoxin (30-33000) the ratio at the equivalence zone is near 10 i.e. double of that observed for diphtheria toxin (molecular weight 70,000) with equine antitoxin."

EICHBAUM, F W Ação dermatotóxica de venenos ophiônicos e sua neutralização pelos antivenenos. [Dermatotoxic Activity of Ophidian Venoms and their Neutralization by the Antivenenes.] *Mem. Inst. Butantan* 1947 v 20 79-83 English summary

Parenteral injection of the antivenene of *Bothrops jararaca* gives protection against the general toxic action of the venom, but will not prevent the local necrotic effect. In this article the author records his study of the dermatotoxic action of the venoms of *B. jararaca* and of the rattlesnake *Crotalus terr.* in rabbits and dogs. Three types or degrees, of action result from the local application of the venom to the skin: oedema with surrounding infiltration, haemorrhage and necrosis. A study of the different fractions of the venom of *B. jararaca* showed that the fraction producing oedema was different from that producing the haemorrhage and necrosis. The former is not neutralizable by the antivenene even in large doses and is moreover thermostable withstanding heating to 100°C. for 10-15 minutes; the latter is neutralizable (in vitro) by the antivenene and will not resist a temperature of 65°C. for half an hour. If venom and antivenene are left in contact for that time at 37°C., local injection of the mixture prevents the haemorrhage and necrosis but not the oedema.

In the case of *Crotalus* venom, if this be applied to the skin, erythema, oedema and necrosis follow and the [intravenous?] injection of antivenene will not affect this. It is presumed that the concentration is not sufficient, but if local injection of venom and antivenene or even if the antivenene be injected 10 minutes after the venom, prevents the necrosis and the erythema, but not the oedema, just as with *B. jararaca*. The reaction to heat in the case of *Crotalus* venom differs also from that of *B. jararaca*. A temperature of 65°C. for 30 minutes abolishes its necrotizing action; boiling for 10 minutes reduces, may even abolish its power of producing erythema and oedema. H. H. & J. Scott

EICHBAUM, F W O fator de difusão (Spreading factor) dos venenos de *Bothrops jararaca* e de *Crotalus terrificus*. [The Spreading Factor of the Venoms of *B. jararaca* and *Crotalus t. terrificus*.] *Mem. Inst. Butantan* 1947 v 20 95-103 2 graphs. [19 refs.] English summary

In this study the animals used for experiment were white rabbit because their skin is thought to be particularly sensitive in indicating the presence of factor. Four samples of *Bothrops* antivenene and 4 of *C. t.* antivenene and 1 of normal horse serum were used. That the venom of these snakes contains a "spreading factor" has been known for nearly 10 years. The author has found

that this is counteracted by the specific antivenenes. It is, however, enhanced by the addition of horse serum, although the latter by itself has no spreading activity. Since the antivenenes are prepared from horses, the risk is obvious. This serum also fosters the haemolysis resulting from the venom and the transformation of haemoglobin into methaemoglobin. Partly responsible for the spreading may be the property of liberating histamine which is possessed by the venoms and it is known that histamine favours the migration of colloidal particles in the cutaneous tissue. The author remarks, in passing, on the presence of mucinase in the venom, a substance which lowers the viscosity of hyaluronic acid, this test was made on the vitreous body of the eye of the ox.

H Harold Scott

DERMATOLOGY AND FUNGUS DISEASES

WALSH, E. N. *Tinea Nigra in Panama* *Arch Dermat & Syph* 1948, Apr, v 57, No 4, 732-3

"Tinea nigra (black fungus) of the palm of 3 white North Americans stationed in the Panama Canal Zone is reported. The disease is caused by a black fungus, *Cladosporium werneckii*, is symptomless and is only of cosmetic importance."

HAUSMAN, R. Over Madura-voet en actinomycose in Indië [Madura Foot and Actinomycosis in the Netherlands East Indies] *Geneesk Tijdschr v Nederl-Indië* 1942, Feb 17, v 82, No 7, 307-19, 5 figs on 1 pl [23 refs]

The English summary appended to the paper is as follows —

"Madura foot is a deep, chronic, fungous affection of the foot, in the Netherlands-East-Indies hitherto reported in immigrants (four cases), to which is added a new case, occurring in an Arab.

"Description of three endemic cases in Javanese from East-Java. The fungi did not belong to the actinomycetes, but could not be identified however. One of them probably belonged to *Indiella mansonii* (BRUMPT's white mycetoma).

"From the brief descriptions of twelve new cases of actinomycosis, diagnosed in the past five years at the department for pathological anatomy of the Governments Medical School at Soerabaja, it is obvious that actinomycosis occurs as frequently in the Netherlands-East-Indies as anywhere else. Therefore it is remarkable that up to the present no cases of actinomycotic mycetoma pedis have been recorded in this country."

SASLAW, S. & CAMPBELL, Charlotte C. The Use of Yeast Phase Antigens in a Complement Fixation Test for Histoplasmosis. I Preliminary Results with Rabbit Sera. *J Lab & Clin Med* 1948, July, v 33, No 7, 811-18 [19 refs]

The authors deal with the vexed question of the specific character of the complement fixation reaction when applied to tests with *Blastomyces* and *Histoplasma* antigens and the respective immune sera. They employed as antigens washed, heated suspensions of yeast form cultures of *H. capsulatum* and *B. dermatitidis* and immune sera obtained by inoculating rabbits intravenously with formalized suspensions of the fungi. The injections were given daily for six days and were followed by two or more "booster" injections at intervals of 7 days. Using the Kent and Reip technique of the complement

fixation test they found that cross reactions occurred at relatively low serum titres when these antigens were tested with the heterologous antiserum. By taking quantitative readings, however, they found that the titre of complement fixation was always much higher with the homologous than with the heterologous combinations. For this reason, they recommend that in all diagnostic tests the serum should be tested against both antigens. These findings contrast with those of SALVIN (see this *Bulletin* 1948 v 45 731) who using the Bengtson (wrongly spelled Bengtson) complement fixation technique found no cross reactions between *Histoplasma* and *Blastomyces*. The present authors therefore tested antigens prepared according to Salvin's method, with immune sera using the Kent and Rein technique and found that cross reactions occurred.

Histoplasma antigen did not react with immune sera for *Candida albicans*, *Toxoplasma neoformans*, *Sporotrichum schenckii* or *Paracoccidioides brasiliensis*.

J. T. DUNN

SAGLAM T. Türkiye'de ilk histoplazmozis vakası. [First Reported Case of Histoplasmosis in Turkey.] *Türk Tıp Cem. cii Mecmuası* 1945 Dec., v 11 No. 1. [1 Turkish 494-503, figs. (11 refs. English summary 74-8)]

A fatal case in which *H. capsulatum* was isolated from spleen puncture

LACAS C. de S. & DR. OLIVEIRA E. Blastomycose da região ano-retal. Considerações sobre dois casos. [Blastomycosis of the Ano-Rectal Region. Consideration on Two Cases.] *Hospital* Rio de Janeiro, 1945 June v 33 No. 6 845-54 3 figs. (11 refs.) English summary (8 lines).

Little is known of the epidemiology of South American blastomycosis but it is generally assumed because of the almost constant occurrence of early lesions of the disease on the bucco-pharyngeal mucosa that this is the most frequent portal of infection. The source of the infection, however, has not been proved and in this respect the observations of the present authors are of special interest. After referring to two cases, reported in 1930 and 1940 in which lesions, which may have been primary, were present in the ano-rectal region they describe two new cases with lesions in this area, and point out the probable association of the infection with the use in the toilet of the anus, of leaves and other raw vegetable matter which may carry the fungus *Paracoccidioides brasiliensis*.

When the disease is generalized it may be difficult to decide whether the ano-rectal lesions are primary or secondary to lesions in other parts of the body, but the authors are satisfied that in two or possibly three of the cases referred to the site of infection was the ano-rectal mucosa and the source of the fungus the vegetable material used in the anal toilet.

In treatment sulphadiazine internally and applied locally supplemented by a fungal vaccine proved effective.

J. T. DUNN

HEAT STROKE AND ALLIED CONDITIONS

PELLICCIOTTA, R. Psicosi da colpo di calore. [Psychosis from Heat Stroke.] *Acta Med. Italica*, 1948 July v 3 Suppl. No. 3 120-24. English summary (5 lines).

An interesting case. A man of 32 years, on a ship in the Red Sea, spent a convivial evening with companions and drank several beers. He was

known to indulge fairly freely in alcohol apart from festive occasions. He left them to go to bed. At 5 a.m. he was seen wandering about the deck. He would not speak and did not appear to recognize anyone. He was admitted to hospital. His face was pallid, eyes open, face immobile with an "indefinable smile" and contented expression. He seemed quite oblivious of his surroundings and took no notice when questioned and lay motionless except that his fingers moved as if he were unravelling string. This movement ceased if the hands were held, but began again when they were released. Breathing was calm and regular, pupils normal, reacting to light, patellar reflexes normal, no sign of drunkenness. About 7 a.m. the temperature began to rise and went to 42°C. at 9 a.m. he passed into coma and died at 9.30. The temperature remained up after death [how long is not stated]. The diagnosis from cerebral malaria, epilepsy, dementia precox and other conditions is discussed. The author refers to another case, closely resembling this and also ending fatally, in which the symptoms occurred in an alcoholic. [Unfortunately, no post mortem examination was held, at all events it is not mentioned in this paper.]

H Harold Scott

CHRISTENSEN, W. R. Effects of Physical Characteristics of Fabrics upon Physiological Heat Load and Subjective Reactions. *J Indust Hyg & Toxicol* 1948, July, v 30, No 4, 251-5 [11 refs]

For some textile fabrics physical characteristics, such as their thermal resistivity, have been determined, but for many of the new fabrics used for special military clothing during the war no such data were available. Furthermore, no information was available concerning the physiological load imposed in hot environments by the wearing of garments made from some of these fabrics. The present paper describes the results of an investigation of the physiological heat-loads imposed by some of these garments, and of subjective reactions of the wearers. The tests were made in a climatic chamber under simulated jungle conditions. Air and walls were kept at 90°F, with the wet-bulb temperature at 86°F, and the wind speed was 1.5 or 5.8 miles per hour. The subjects were six to ten soldiers who had been acclimatized to the test environment for one month. The garments tested were U.S. Army fatigue uniforms made from nine test fabrics varying from light poplin or nylon cloths to a cotton herring-bone twill. This latter fabric was of 70 per cent greater weight than the lightest ones. The dry weights of the uniforms varied from 887 gm for the nylon twill to 1,450 gm for the heavier cotton twill. The air permeability of the fabrics varied greatly—from only 2.1 cc per second for a cotton Oxford cloth to 171 cc per second for a Fortisan yarn mesh.

During the experiments, the subjects walked on a horizontal treadmill at 3½ miles per hour for a period of one hour, wearing one of the test uniforms over a standard basic assembly. Rectal temperatures and pulse rates were measured at the end of the exercise, and the sweat loss during the period of exercise was ascertained. The comments of the subjects dealt mainly with coolness, drag, skin sensation and overall preference.

With a wind of 1½ miles per hour, the heat loads imposed by the test fabrics were influenced mainly by their weight, thickness, and possibly by the degree of wetting during use. With a wind of 5.8 miles per hour, however, different results were observed. Then the fabrics which showed improvement with respect to heat load were those which presented a greater wetted area and were more permeable to air. Coolness, general skin sensation, and the tendency of the material to drag on the skin were the most important criteria in deciding the subjective acceptability of a uniform, coolness and skin sensation being of

major importance. There were however inconsistencies between objective and subjective appraisals and it is concluded that the test subjects were unable to differentiate clearly between the sensation of coolness and other sensory impressions.

Thomas Buffin

TROPICAL ULCER

SHILLONG KING EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE 30TH ANN. REP. YEAR ENDING 31ST DECEMBER 1946 (PANDIT S. R. Director) pp. 2-3. Naga Sore Enquiry (Indian Research Fund Association) under the Director

During 1946 eleven patients with "naga sore" (a local variety of tropical ulcer) were studied in the hospital attached to the Institute. All patients were from tea estates. The ulcers were distributed on the lower extremities and were multiple in 4 cases. Seven patients gave a history of trauma and in two the ulcer began on scabies lesions. Blood examination showed evidence of malaria in 2 cases and *W. bancrofti* in two others (without clinical manifestations). One patient harboured ankylostomes and four had other helminths. There were one strong positive and three doubtful Wassermann tests. More than half of those affected suffered from a moderate anaemia, but specific evidence of malnutrition was absent.

The bacteriological flora was characteristic of the usual findings. *Staphylococcus* organisms were constant and in great numbers in the acute stage but decreased with age of the ulcer. *Spirochaetes* were present in four.

In some cases the fusiform organism could be isolated in primary growth, but not in subculture. Growth requirements were studied in detail with two isolated strains. The organism was a strict anaerobe (for primary isolation 5 per cent CO_2 was used, but after a few subcultures an atmosphere of hydrogen sulphide proved satisfactory). The organism was Gram-negative in culture non-motile and pleomorphic. In subculture the beaded appearance was readily demonstrated with Giemsa stain. Colonies were round minute and clear resembling those of streptococci.

The organism failed to liquefy gelatin and to ferment glucose lactose mannite saccharose maltose and salicin. Blood or serum supplements were required to produce growth in carbohydrate medium. Indole was formed. Attempts to prepare agglutinable suspension were not successful. The *spirochaete* could not be cultivated.

Application of the discharge from an active sore did not produce lesions in rabbits or guinea-pigs either directly on the scarified skin or by intradermal inoculation. These methods did however produce typical ulcers, with predominating fusiforms in human volunteers. It is added that in these cases there was also shown the presence of Gram-positive cocci and (in one case) *Proteus*. Intradermal and subcutaneous injection of a young culture of the fusiform organism produced no lesion in a recovered case of naga sore. A killed suspension failed to elicit an allergic reaction in an active case either by intradermal or intraocular inoculation. A small vesicle which retrogressed without resulting in a sore was produced in 24-48 hours in three healthy volunteers after intradermal inoculation of a thick suspension of a culture of the fusiform organism, with or without a filtrate from a discharging sore. The filtrate alone did not produce any reaction.

An epidemiological survey was made of tea estates in the Dibruagarh area of Upper Assam. Seventy-five persons gave a history of having had the sore in 1945. A few still had unhealed ulcers. Forty-one were females (an unusual

preponderance, related perhaps to occupation] All but six were engaged in outdoor horticultural work. The largest number were between the ages of 10 to 30 years there were none below the age of 10, but six were over 50. In one-third of the cases, the ulcers were multiple, and all were on the lower extremities. Thirty-nine persons had a known history of trauma at the site of the lesion (27 cuts, 10 leech-bites, 2 wasp-stings). In the others, itching vesicles and papules were said to have appeared spontaneously. There was no evidence to incriminate any insect vector.

While cases continued during the rainy season in some estates, others with heavy rainfall escaped. Two contiguous gardens had different histories—several cases in one and none in the other. One estate had sporadic cases in 1944, but an almost epidemic form of the disease developed in 1945. New-comers, such as labour recruits, were not more susceptible than older residents.

It is considered that diet plays little part in the aetiology of the disease, which varied within wide extremes of incidence or complete absence over several years despite a diet generally deficient in essential protein and vitamins. It is regarded as of little doubt that the widespread naga sore infection, which occurred over the greater part of Northern Assam in 1942-43 could be traced to the return to their homes of repatriated labourers from infected military camps.

[Although the series of ulcers studied is not large and no striking new information is added to the literature of this elusive disease, the method of approach and the range of investigations carried out at the Institute are to be commended and would well repay repetition in other areas.]

H J O'D Burke-Gaffney

MATHIEU, M. Aluminium et ulcère phagédémique [Aluminium and Tropical Ulcer] *Bull Méd de l'Afrique Occidentale Française* 1947, v 4, No 3, 195-202

This article is based on work done in Dahomey, West Africa, and the author comments on the many different methods of treatment which have been advocated. Treatment with aluminium was first used by a naval surgeon, Brette, in 1939, and, although up to the present the precise mode of action of this metal is a matter of controversy, the results appear to have been very effective. As the author remarks, tropical ulcer is a "veritable plague" in Africa, and by reason of its frequency and chronicity fills up the hospitals and dispensaries.

Eight cases are described in detail, all being typical instances of clinical tropical ulcer. There is no record of any bacteriological or histological examinations having been made.

Although aluminium appears to have a curative effect on the phagedaenic process, its chief use is in the period of cicatrization which is often so prolonged. Among the local inhabitants, the lesion is usually already far advanced and of considerable extent when first seen.

Methods of Treatment

1 Powdered aluminium. The ulcer is first carefully cleansed with ether, aluminium powder then thickly sprinkled on, and an ordinary dressing applied. The powder must be re-applied in not more than three days.

2 Aluminium in the form of a plaque, 1/10 to 2/10 mm thick. This is about the thickness of a piece of notepaper.

The plaque must be moulded to the general contour of the ulcer, and overlap the lesion so as to avoid injury to its edges. It is applied after cleansing with ether, either directly or after powdering with aluminium. Two holes are drilled into the overlapping part, through which pass a fixation tape. It is essential to leave the plaque *in situ* for several days, and this can be used several times; it is sufficient to clean it carefully with ether before each re-application.

Aluminium powder seems to give the better results on account of the closer contact between the metal and the lesion.

Systematically used this treatment has always given good results whatever the condition of the ulcer, cure being assured in a period of 15 to 35 days. From the first application suppuration diminishes, the surface of the ulcer clears, it dries up and takes on a healthy red appearance. Soon epithelium appears at the periphery and filling in and cicatrization progress rapidly from the periphery to the centre.

The advantages claimed are —

1. Simplicity, cleanliness, and rapidity of action.
2. Economy in the use of dressings.
3. Complete tolerance in all cases.

[An interesting paper. This form of treatment would appear to be worth an extensive trial.]

C. F. Shatto

MISCELLANEOUS DISEASES

ORDMAN B. A Review of the Incidence of Hypertension in the Non-European Races. Survey of Blood Pressures in the South African Bantu. *Ch. Pr.* Cape Town 1948 June v 7 No 6 183-210 [37 refs.]

Most of this article consists of a review of the literature on the incidence of hypertension in non-European races. RODDIS and COOPER (*J Amer Med Ass* 1928 v 87 2053) examining a number of European officers stationed in the tropics and on their return to cooler climates concluded that —

- I. Blood pressure is modified by climate.
- II. The indigenous inhabitant of the tropics has a blood pressure lower than that of the temperate zone standard.
- III. In the tropics the systolic pressure of the northern white men averaged 10-15 mm. below the standard of temperate zones, this being due to a lower vasomotor tone and a general slowing of physiological activity.

A study of 774 healthy male Cantonese students by CADBURY (*this Bulletin* 1924 v 21 417) showed that the systolic pressure averaged 20 to 30 mm. and the diastolic 10 to 20 mm. less than in European and American youth of corresponding age weight and height. Hypertension was very rare either with or without nephritis, although Bright's disease was common. Among other reasons for this, the use of opium is given as an explanation. The work of other observers bears this out as regards the blood pressure of the local Chinese. DRELAIDE (*Bull Johns H Hosp* 1940 v 66 408) in 215 cases of essential hypertension, found obesity in 40 per cent.

Blood pressure studies by CONCEPCION and RELATID (*this Bulletin*, 1917 v 9 460) in 697 male and 213 female Filipinos between the ages of 15 and 68 years showed a range pressures 115-79 mm. for males and 117-63 for females. In 65 opium addicts the blood pressure was lower than the average among non-addicts. A comparison by CHAMBERLAIN (*Philippine J Sci B. Med Sci* 1911 v 6 467) of the blood pressures of 329 Filipinos between the ages of 15 and 40 years with those of American soldiers of similar ages stationed in the tropics showed no essential difference between the two groups.

In 500 male Bengalis between 20 and 25 years McCAR (*Lancet* 1907 June 1 1483) found the average systolic pressure to be 90 to 105 mm.

ISMAIL (*Lancet* 1928 Aug 11 275) in a study of over 3 000 Egyptian patients in private practice concluded that —

1. Chronic primary hyperplexus in the absence of chronic renal changes was common and formed at least 10 per cent. of all cases in private clinics.

ii The disease was specially limited to the decades 35 to 55, and was rare under 30

iii About 10 per cent of cases were females

NYE (*Med J Australia*, 1937, Dec 4, 1000) examined all available old people among Australian aborigines, most of whom were grand or great-grand or great-great-grandparents, and found an entire absence of hypertension. It is pointed out that these people live in a state of great simplicity, *i.e.* they do not suffer from the strain of modern civilized life. Gross oral sepsis and cervical adenitis were present, they were heavy smokers and chewers of strong tobacco, and were almost entirely carnivorous. They hunted for their food and gorged only when hungry, often fasting for several days when food was scarce. The question of alcohol is not mentioned.

This observer concluded that age *per se* did not cause hypertension, and that "arteriosclerosis and hypertension may be the price civilisation pays for modern amenities in satiated appetites, sartorial perfection and vitiated atmosphere, and for our successes in a life of stress and strain."

Hypertension in the American Negro has received much attention, and the author quotes from ten papers on this subject. All the writers quoted agree that the incidence is much higher among the negro than the white population, being roughly from two to three times as common. One worker found that the incidence was 6.2 times as high in the age group 30 to 39 years, despite the fact that two hypotensive influences (malnutrition and tuberculosis) were common. The African, when transplanted to modern conditions of civilization, appears less able to adapt himself than his white neighbour.

Investigations by DONNISON [*this Bulletin*, 1930, v 27, 162] of the blood pressure in 1,000 healthy male Africans, aged 15 to 70 years, living at an altitude of 5,700 feet in the South Kavirondo District of Kenya, showed that up to the fourth decade the average readings were similar to those of Europeans, but that there was a tendency to lower readings in later life. Chronic septic infections were common, meat was frequently eaten, but there was an absence of "high pressure" existence.

VINT (*East African Med J*, 1937, v 13, 332) who studied 1,000 consecutive autopsies in Nairobi, states that "True nephrosis as represented by the arteriosclerotic kidney is rare in Kenya. The writer has not seen a case of essential hypertension nor do medical records of the Colony show evidence of its occurrence."

This condition is, apparently, also rare in Uganda.

JEX-BLAKE (*ibid*, 1934, v 10, 286) agrees with Vint, but the author thinks that their conclusions from autopsy studies are questionable.

BECKER (*M D Thesis, Univ Witwatersrand*, 1943, *this Bulletin*, 1946, v 43, 1076), from an analysis of autopsies performed in Johannesburg between 1924 and 1938 concluded that hypertensive heart disease was the most common form of cardio-vascular disease amongst the Bantu and coloured races of South Africa as judged from post-mortem statistics, the condition being found in 247 instances in 3,000 routine autopsies.

Original work is presented by the present author on 1,522 apparently healthy male and female Bantus in South Africa.

Blood pressure readings were taken with a mercury manometer (Baumanometer) with the patient sitting, the effects of excitement and emotion being ignored. The systolic pressure was taken on the appearance of the first sound after deflation of the cuff and the diastolic on disappearance of all sound, readings being taken in the right arm. The following groups were examined—

1 Mine workers returning from an underground shift at a gold mine at Germiston, Transvaal

2 Mine workers and labour recruits being examined in Johannesburg

- 3 Women receiving antenatal examination in Johannesburg
- 4 Rural Africans in the Mafeking District (from three localities).
- 5 Groups of urban and rural Africans in Natal and Zululand, from eight different districts.

A diastolic pressure of over 90 mm. was taken to mean that the subject was either a hypertensive or a hyperreactor and a systolic pressure of over 140 and a diastolic of 90 mm. or less was the criterion of systolic hypertension. No attempt was made to eliminate the factor of emotion or to obtain a modified basal reading at rest. The author considers that a hyperresponse to the excitement of examination is a valuable early sign of the hypertensive process. [Some would consider these figures on the low side.]

Of the total number examined the results were as follow. Of 708 males, 152 showed a diastolic B.P. over 90 and 42 a systolic B.P. over 150 and a diastolic of 90 or under. The corresponding figures for 814 females were 171 and 42. The incidence of a diastolic B.P. of over 90 rose with age but leveled after 70 in males. No racial or tribal correlation was found between those with raised diastolic pressures and the normals in any of the groups. In the case of mine workers, there was no relation between blood pressure levels and periods of work underground. There was an association between hypertension and overweight.

[The literature on this subject is very extensively reviewed. As the African becomes more and more highly educated and more under the stresses and strains of modern life it will be interesting to see in a generation or two how his blood pressure reacts.]

C. F. Shuter

TYNDAL, M. Leber Lathyrismus. [On Lathyrism.] *New York Times*, 1948 Oct 8, v 60 No 40 658.

In the same epidemic at Vapniarka as that described by OXTON [this Bulletin 1948, v 45 735] the author saw 9 cases in men of 16 to 30 years of age who began to show symptoms 2-3 months after starting on a diet consisting very largely of *Lathyrus sativus*. Two were mild cases the others severe. When seen 1½ years after the onset there had been some degree of improvement, but only the two who had been lightly affected could walk without the aid of a stick. All sorts of treatment had been tried—vitamin B in mouth and parenterally, pyretotherapy, passive movements, massage and electrical treatment, baths, liver injections, blood transfusions, nicotinic acid, nicotinamide, arsenicals such as sodium cacodylate and sodium arsenite. It is not possible to say to which, if any of these the improvement was to be attributed but the author thought that the passive movements and the baths and perhaps the blood transfusions all played a part. After two years the gait improved but the chief symptoms remained unchanged. As regards causation apart from the toxic element of *Lathyrus* the general dietetic deficiency and the avitaminosis take a share. Vitamins C and D are present in small amount only in *Lathyrus*—arsenite is thermostable and the prolonged cooking needed to make the *Lathyrus* fit for eating destroys the vitamin B entirely.

H. Harold Scott

D. VITA, J. N. P. Pathology of Central African Natives. *Malaga Hospital Post Mortem Studies*.—VIII. *East Africa Med J* 1948 Aug 35 No. 8 322-6

GUTNER, L. B. & FISHER, M. W. Chronic Meliodosis. Discussion, Case Report, and Special Studies. *Ann Intern Med* 1948 June v 28 No. 6, 1157-68 6 figs. [16 refs.]

This is a detailed report of a case of chronic meliodosis in an American soldier contracted probably in the Philippines. The liver, spleen, lungs and

glands were affected and *Pf whistleri* was isolated from the numerous abscesses which were incised. For some time a diagnosis of infectious mononucleosis was considered, owing to the occurrence of a positive Paul-Bunnell reaction in high dilutions of the patient's serum. The differential diagnosis is discussed. The infecting organism was resistant *in vitro* to streptomycin, penicillin, sulphadiazine and urea, and to combinations of these drugs, in higher concentrations than could be achieved in the blood. This is believed to be only the second case of melioidosis diagnosed in the Western hemisphere.

J C Cruickshank

ARGUELLES CASALS, D. Aftosis generalizada de Touraine (síndrome de Behcet). Primer caso Cubano [Behcet's Syndrome—Generalized Aphthosis of Touraine. First Case described in Cuba.] *Rev Sifilografía, Leprología y Dermatología* Marianao, Cuba 1948, Jan, v 5, No 1, 228-34 [14 refs.]

Characteristic symptoms of Behcet's syndrome are aphthae of mouth and genitalia, ocular lesions such as conjunctivitis, keratitis, retinitis, iritis, phlyctenules, hypopyon cutaneous lesions—nodular, acneiform, pustular eruptions, arthralgia and arthritis, systemic disturbances such as fever and chills in repeated attacks. In some cases the cutaneous and systemic manifestations predominate, in others the mucosal. The cause is not known, but is probably a virus, treatment is unsatisfactory.

The author describes the case of a Cuban woman, 38 years of age, with cutaneous lesions, nodular, red in colour, with undefined edges, in both legs, and oedema of the right ankle, painful aphthae of the buccal mucosa and the border of the tongue, later, similar lesions appeared on the internal aspect of the right labium majus. She had had several attacks during the year, accompanied by severe general pains, headache, fever and giddiness, and lasting 4-7 days as a rule, but sometimes as long as 3 weeks. The Frei and Mantoux tests were strongly positive, Kahn and Meinicke negative. The positive Frei reaction brought up for consideration a diagnosis of lympho-granuloma inguinale, but the usual treatment of this was unavailing and the final diagnosis was Behcet's syndrome, in spite of the absence of ocular symptoms. [Touraine is the name of the author who described this condition in 1941 (*Bull Soc française Dermat et Syph*, 1941, v 48, 61) and has nothing to do with the French Province of Touraine. See also this *Bulletin*, 1946, v 43, 379, 1074.]

H Harold Scott

SEKBAN, S. M. Deri Kostebeği hastalığı [Creeping Disease] *Türk Tıp Cemiyeti Mecmuası* 1947, Sept, v 13, No 9 [In Turkish 398-9. English summary 57.]

The first case seen by the author, a dermatologist, in 44 years. He believes that the extreme rarity of records in Turkey is due to ignorance of the disease. The aetiology is not mentioned in this summary.

H J O'D Burke-Gaffney

CALERO, C. Cutaneous Myiasis in Panama. *J Parasitology* 1948, Aug, v 34, No 4, 343-4.

"The author reports a new case of cutaneous myiasis due to *S. haemorrhoidalis* (Fall) which is reported for the first time from the Isthmus of Panama.

"A first report is made also, but with reservation, of cutaneous myiasis due to *C. hominivorax* (Coq). Our reservation is due to the fact that for Panama there has been no comparative study since 1933 of the larvae originally reported as *C. macellaria* whereas numerous cases of cutaneous myiasis elsewhere reported before 1933 as due to these larvae proved later to be due to *C. hominivorax*."

PROTOZOOLOGY GENERAL

MACDONALD ETTA M. & TATUM A. L. The Differentiation of Species of Trichomonads by Immunological Methods. *J Immunology* 1948 July v 62 No. 3, 309-17 [18 refs.]

The authors have studied the possibility of differentiating three species of the genus *Trichomonas* by serological techniques with the special object of demonstrating the identity or otherwise of *T. hominis* and *T. vaginalis*. The third species used in the experiments for comparison was *T. foetus* of cows.

The serological techniques employed in the experiments were agglutination and agglomeration. The latter term refers to aggregation of motile flagellates with the posterior extremities towards the centre and the flagella of the anterior extremities actively motile at the periphery.

In preparing the immune sera, bacteria-free cultures of trichomonads were used as antigen and rabbits were immunized by intravenous inoculation, the sera being subsequently titrated by a micro-agglutination method. In some of the tests absorption of antibodies in the sera by one or other of the antigens used was resorted to as a preliminary to cross titration experiments both in agglutination and agglomeration.

The results of the various experiments performed may be summarized as follows —

1. Specific antisera prepared against the three species of *Trichomonas* under experiment produced specific agglutination and agglomeration of their organisms.
2. Cross-agglutination and cross-agglomeration tests between *T. hominis* and *T. vaginalis* gave identical results within experimental error but the results were significantly different in the case of *T. foetus*.
3. Absorption of *T. hominis* antisera by *T. vaginalis* removes the antibody for *T. hominis* and vice versa.
4. Absorption of *T. hominis* and *T. vaginalis* antisera by *T. foetus* removes the same amount of antibodies in each case.
5. The results of the various experiments indicate that *T. hominis* and *T. vaginalis* have identical antigenic structure.

H. E. Short

CROSS JOY B. & AXIGSTEIN L. Chemotherapeutic Study of Experimental Toxoplasmosis—Preliminary Report. *Texas Reports on Biol. & Med* 1948 v 6 No. 7 280-65 [13 refs.]

This is an investigation into the treatment of experimental toxoplasmosis in mice by six drugs used either alone or in combinations of two. The drugs tested were streptomycin, PARA, (theophylline toluidine blue Sulfamylon and Aralen [Chloroquine diphosphate]. The numbers of mice employed in the experiments were small and the results of treatment showed no significant differences when compared with the results in untreated controls.

H. E. Short

ENTOMOLOGY AND INSECTICIDES GENERAL

REYES R. V. Artrópodos de interés médico: eternario comprobados en Colombia [Arthropods of Medical and Veterinary Interest in Colombia. *Rev. Colombiana de Zoonosis Hig. y Med. Vet.* 1947 Oct-Dec 1 No. 10 11-12, 693-721 [Bibliography].

A table of 20 pages.

GÓMEZ, L. Revisión crítica de los casos de oftalmomiasis españolas [A Critical Revision of the Cases of Ocular Myiasis in Spain.] *Rev Ibér Parasit* 1946, Jan-Apr, v 6, Nos 1/2, 51-73, 2 pls [30 refs] [Summary taken from *Rev Applied Entom* Ser B 1948, July, v 36, Pt 7, 119]

In view of a case of ocular myiasis due to *Oestrus ovis*, L., in man in Granada in 1945, the author gives a list of about a dozen such cases that have been recorded in Spain since 1918. The identity of the larvae concerned is not certain in every one, but *O. ovis* appears to be the fly most frequently responsible, though it has sometimes been misidentified, only one case was certainly due to *Rhinoestrus purpureus*, Brauer. The first-instar larvae of these two flies, which have sometimes been confused, are described, that of *R. purpureus* from the work of Portchinsky, and characters are given distinguishing them. The larvae of *O. ovis* observed in Granada and those described by Coulon & Dinulescu from Corsica are considered to represent different varieties, which are distinguished by the form of the spiracles as vars *granatae* and *corsicae*, n

RIDDELL, W A, REMPEL, J G & McNELLY, Elspeth. The Specificity of the Precipitin Reaction, as used in the Study of Mosquito Feeding Habits. *Canadian J Res Sect E Med Sci* 1947, Dec, v 25, No 6, 210-15, 1 pl

The authors have investigated the reliability of the precipitin test when used with the stomach contents of mosquitoes which had been given the opportunity to feed on one, two or three animals. The mosquito used was *Aedes aegypti* and the animals were man, rabbit and guinea pig. The feedings were classified as negative, single (on any one of the three animals), double (on any two) and triple (when fed on all three). With double and triple feeds, the order of the feedings and the time interval between meals were varied. The following table summarizes the feedings and reactions —

Feeding	No of specimens	Total individual feedings	Reactions			Total Errors
			Correct	Missed	Extra	
Unfed	90*	90 [unfed]	90	—	—	0
Single	307	307	287	13	7	20
Double	341	682	652	26	4	30
Triple	6	18	15	3	—	3
Totals	—	1,097	1,044	42	11	53

* This includes 79 unfed *Culex tarsalis* reared from larvae. They gave negative results to human, equine, bovine and avian sera.

These figures indicate a high degree of specificity (95.17 per cent.), the total errors being only 4.83 per cent., the false positives amount to only about 1 per cent. If the negative feedings are excluded, the value of 94.7 per cent. sensitivity for positive reactions is obtained. The figures also disclose that multiple reactions signify multiple feedings, since of double feedings 92.4 per cent. were correct. A point of importance in relation to field work is the fact, that of the 654 mosquitoes known to have fed on one or more of the hosts, 162 specimens showed no distention of the abdomen when killed, yet 91.2 per cent. of the feedings were accurately determined by the precipitin test.

H S Leeson

LOCKE D. A., Jr. Notes on a *M. zanzibaricus* Problem at Edgewood Armd., Maryland. *Mosquito News* 1948 June v. 8, No. 57-60, 1 fig.

TEIXEIRA A. W. G. A propósito da criação experimental de *Phlebotomus*. [Experimental Rearing of *Phlebotomus*.] *An Inst Med Trop Libor.* 1947 Dec. v. 4 107-48. [25 refs.] English summary

The paper discusses studies in the field and the laboratory on *Phlebotomus* in Portugal. The species captured were *P. perniciosus*, *argutus*, *muscivorus* and *arvensis* with a massive predominance of the former. In the neighbourhood of Lisbon the commonest species is *P. perniciosus* but *P. argutus* was found breeding in one limited area. Specimens of *muscivorus* and *arvensis* were taken but there is no reference in the paper to *P. papatasi*. Most of the biological notes refer to *P. perniciosus*. The adults were first seen in the middle of April, became most abundant or most noticeable in August or September and disappeared in the middle of November. In the laboratory, eggs were deposited from early June to mid-November. The paper contains a number of notes on the proportion of females which had recently fed, the number of eggs laid and other matters. It includes a résumé of the work of other authors on methods of obtaining a culture of *Phlebotomus*. P. A. B. (14)

ABONNENC E. & CHASSIGNET R. *Phlebotomes de la Guyane française* (XXIII). Description d'une espèce nouvelle *Phlebotomus flochii*. [Phlebotomus of French Guiana (XXIII). A New Species of *Phlebotomus* from French Guiana: *Phlebotomus flochii*.] *Institut Pasteur de la Guyane et du Territoire de l'Inini*. Publication N° 167. 1948 Jan. 4 pp., 9 figs.

FLOCH H. & CHASSIGNET R. *Phlebotomes de la Guyane française* (XXIV). Description de deux femelles nouvelles. [Phlebotomus of French Guiana (XXIV). Two New Females.] *Institut Pasteur de la Guyane et du Territoire de l'Inini*. Publication N° 170. 1948 Mar. 6 pp., 2 figs.

FLOCH H. & ABONNENC E. Sur une variété de *Phlebotomus roudoudi* Newstead, 1913. *P. roudoudi* var. *fourieri* nov. var. [Phlebotomus roudoudi var. *fourieri*, a Variety of *P. roudoudi* Newstead 1913.] *Institut Pasteur de la Guyane et du Territoire de l'Inini*. Publication N° 169. 1948 Mar. 4 pp., 10 figs.

FLOCH H. & ABONNENC E. *Phlebotomes du Venezuela*. Sur la femelle de *P. cayennensis* Floch Abonenc, 1941. [Phlebotomus of Venezuela. The Female of *P. cayennensis* Floch Abonenc, 1941.] *Institut Pasteur de la Guyane et du Territoire de l'Inini*. Publication N° 168. 1948, Jan., 3 pp., 6 figs.

LEES, A. D. & BEAMENT J. W. L. An Egg-washing Organ in Ticks. *Quart. J. Microscop. Sci.* 1948, Sept. v. 89 Pt. 3 291-302, 13 text figs. & 15 figs. on pl. [26 refs.]

GINSBERG, J. M. A Rapid Method for preparing DDT in the Laboratory. *Science* 1948, Sept. 24 339-40.

WAIN R. L. & MARTIN A. E. Determination of p,p'-DDT in Commercial Samples. *J. Anal. Chem.* 1948, Sept., v. 73 No. 870 479-83, 3 figs. [11 refs.]

DE JONGE J. C. M. & CAHN FORTOS S. Ervaringen met DDT. [Experiences with DDT. *Nederl. Tijdschr. Geneesk.* 1948 Oct. 23 69 (iv) No. 43, 3404-8 8 figs. on 1 pl. English summary]

SMITH, C N & BURNETT, D, Jr Laboratory Evaluation of Repellents and Toxicants as Clothing Treatments for Personal Protection from Fleas and Ticks *Amer J Trop Med* 1948, July, v 28, No 4, 599-607

This paper describes preliminary sorting tests with a large number of compounds. Details should be sought in the original paper.

H J O'D Burke-Gaffney

LABORATORY PROCEDURES

BLACK, R H Haemoglobin Stains adapted for use with Thin Blood Films *Ann Trop Med & Parasit* 1948, Sept, v 42, No 2, 236-7

The author has previously discussed the specificity of staining methods for the identification of haemoglobin in tissue sections [this *Bulletin*, 1948, v 45, 873]. For use in the case of thin blood films these methods require certain modifications. In a previous paper, the author described such a method with the use of cyanol [*ibid*, 1948, v 45, 25]. He now briefly summarizes that method and adds two others, namely (1) alizarin red S and phosphomolybdic acid, which method has been used to study the acquisition of haemoglobin in the maturation of red cells of ducklings infected with *Plasmodium cathemerium* and (2) reduced fuchsin and methyl green, which has been used to observe staining reactions of avian malaria parasites and the changes in haemoglobin content of chick erythrocytes during maturation.

For the first method, blood films fixed with methyl alcohol are stained for 15 minutes with Ehrlich's acid haematoxylin. This is washed off with water and the slides are placed for 1½ minutes in 10 per cent aqueous phosphomolybdic acid. Washing is repeated and followed by staining for 18 hours with a mixture of 50 cc of saturated aqueous alizarin red S and 10 cc of 10 per cent aqueous phosphomolybdic acid. The slide is washed again and dried. Haemoglobin in the red cells stains bright yellow, and nuclei—as in avian blood—are well defined and dark purple.

The second method is stated to give a better contrast between nuclei and cytoplasm of avian erythrocytes than any yet studied. Haemoglobin causes the reduced leuco-form of fuchsin to regain its colour and the haemoglobin of the red cells itself becomes stained with it.

The stock solution consists of a mixture of 1.5 gm acid fuchsin, 5 gm powdered zinc, 2 cc glacial acetic acid and 100 cc distilled water. The mixture is boiled and soon becomes decolorized. On cooling, another 2 cc glacial acetic acid is added. The working solution is made by filtering off 10 cc and adding 1 cc of commercial hydrogen peroxide to it.

Methyl alcohol-fixed dried thin blood films are covered with the working solution, which is left until colour intensity is complete—about 3 minutes. The stain is tipped off and the film is counterstained with 0.5 per cent aqueous methyl green for 1 minute. After a brief wash in water, the slide is blotted dry.

Haemoglobin in normal mature red cells stains with fuchsin and nuclei of avian red cells stain green.

In chick blood infected with malaria parasites such as *P. gallinaceum*, the latter appear as rounded pale green areas in the cytoplasm; the pigment is easily seen. In heavy infections, a series of colour changes is seen depending on the degree of maturation and acquisition of haemoglobin. The cytoplasm of erythroblasts stains green—some show mitotic figures. With further maturation, the green staining is lost and more fuchsin appears in the cytoplasm as the nucleus becomes smaller, more oval and more compact. It is only in those cells in which the cytoplasm takes the fuchsin stain that the *P. gallinaceum* are found.

H J O'D Burke-Gaffney

WOLFF J. W. Een eenvoudige snelle kleuring voor bloedonderzoek op malarieparasieten. [A Simple Rapid Stain for Malaria Parasites in Blood. *Nederl. Tijdschr. v. Geneesk.* 1948 Sept. 11 v. 92 (III) No. 37 2304-7 English summary (4 lines)]

The method, which is a modification of Boyd's method [this *Bulletin* 1946 v. 37 737] is carried out as follows. Films and thick drops are prepared and fixed with methyl alcohol in the usual way and stained with Stévenel's fix for 15 seconds. The stain is then rinsed away with tap water and 1/1,000 eosin solution is applied for 15 seconds. After rinsing with tap water the staining with Stévenel's blue and subsequent rinsing are repeated and the slides are then dried.

D. J. Baver

ROSENFELD G. Corante pancromico para hematologia e citologia clinica. Nova combinação dos componentes do May-Grünwald e do Giemsa em só corante de emprego rápido. [Panchromatic Stain for Hematology and Clinical Cytology. A New Combination of the May-Grünwald and Giemsa Components in a Stain of Rapid Application.] *Mem. Inst. Butantan.* 1947 v. 20 329-34 English summary (8 lines).

The author claims that this stain is easy to prepare, simple to use, rapid in action, gives more delicate nuclear and protoplasmic delineation than the May-Grünwald, Giemsa or Pappenheim stains, and, lastly, retains its properties unchanged "for many years." Its constituents are as follows: Azure A 0.342 gm., yellow eosin 0.342 gm., methylene blue 0.286 gm., carbonate of methylene blue 0.530 gm., methanol 1 litre. To a blood smear is added 0.5 ml., which fixes it in 1-2 minutes. Distilled water, boiled for 10 minutes and used within a week, is added in twice the amount of the stain and left for 5 minutes or a little longer. The slide is then washed in distilled water and dried with blotting-paper. The longer it remains wet the more it loses colour. H. Harold Scott

ROSENFELD G. Método rápido de coloração de esfregaços de sangue. Noções práticas sobre corantes pancromáticos: estudo de diversos fatores. [Rapid Method for the Coloration of Blood Smears. Practical Notes on Panchromatic Stains and Studies of various Factors.] *Mem. Inst. Butantan.* 1947 v. 20 315-28, 3 figs. English summary

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. Colonial Research 1947-48. Reports of the Colonial Research Committee, Colonial Products Research Council, Colonial Social Science Research Council, Colonial Medical Research Committee, Committee for Colonial Agricultural, Animal Health and Forestry Research, Colonial Insecticides Committee, Colonial Economic Research Committee. Cmd. 7493. 119 pp. 1948. London: H.M. Stationery Office (2s.)

The principal interest of this Report to readers of the *Bulletin* lies in the third annual report of the Colonial Medical Research Committee and the first report of the Colonial Insecticides Committee.

The former occupies some twelve pages and is closely packed with information regarding research problems in being or contemplated, with brief accounts of the activities of the large number of workers engaged upon them. Much of the work referred to has already been noted in papers abstracted in the *Bulletin*.

The Report mentions the visits made by several medical experts to various parts of the Colonial Empire, especially Africa, and refers particularly to measures to be taken to implement recommendations made by the late Professor

McSwiney after his visit to East Africa in 1946. These include the proposed establishment of an East African Bureau of Medical Research, with headquarters at Nairobi, and of a Health Survey to be located initially in Sukumaland, at the southern end of Lake Victoria in Tanganyika Territory.

Reference is also made to the Virus Research Institutes in Uganda and Nigeria, the proposed handing over to the Colonial Office for a research laboratory of the existing laboratory in Freetown maintained by the Liverpool School of Tropical Medicine, research on hot climate physiology in Nigeria and general physiology in Uganda, and investigations of the bionomics of *Ornithodoros moubata* in relation to relapsing fever in East Africa.

Informative reviews are given of research work now in progress. These include the work on malaria control in Borneo, by Dr J McARTHUR, based on his findings of the rôle of *A. leucosphyrus* as a vector; entomological studies on anophelines in East Africa by Dr Murhead THOMSON, who had investigated *A. gambiae* and *A. melas* in West Africa and now reports interesting findings on salt-water breeding of *A. gambiae* in Dar es Salaam; work on malaria control in the Kenya Highlands; studies on Paludrine in Asia and Africa and the question of possible differences in susceptibility to this drug between Asiatic and African strains of the malaria parasite, the results in Africa having appeared to be less satisfactory than in India and Malaya; and a full description of proposals relating to nutrition studies. This includes references to the work of Drs WATERLOW and WEBB on a "pellagragenic" substance in maize bran and on fat metabolism in the liver; field nutrition research in the Gambia where a station has been set up at Fajara and surveys are being made on clinical features, food consumption, crop production, general agriculture, social services and education. Nutrition research is also carried out in other parts of West and East Africa and in Mauritius, the West Indies and the Far East.

Special mention is made of the recommendations of the Nutrition Subcommittee that a section of applied nutrition be formed, with the object of assisting Colonial Governments further in the efforts to improve the nutrition of their populations, and the detailed objects of such a section are set out.

Work on the control of schistosomiasis and of Miracid in its treatment, is discussed. The work of Drs HAWKING and ROSS of the Medical Research Council Scientific Staff and of Dr BLAIR of Southern Rhodesia is mentioned. The MRC has established a team for research on schistosomiasis and its control in Egypt.

Research on filariasis continues and a team is being sent to Africa to study the chemotherapeutic potentialities of Hetrazan. The work will also be applied to *Loa* and *Onchocerca* infections.

The report presents a concise but comprehensive account of medical research projects in the Colonies, and this presentation under one cover provides striking evidence of the wide range of that work, the extent of which is not always either understood or appreciated.

The first Annual Report of the Colonial Insecticides Committee covers 10 pages and is divided into three parts. The first deals with the general organization and terms of reference of the Committee. Its function is primarily to initiate insecticide research, especially its application in field experiments to examine schemes, problems and new scientific information relating to the subject and to advise and, where necessary, reinforce Colonial Governments or other appropriate bodies accordingly, and to co-ordinate agricultural, medical and veterinary interests in the use of insecticides. In the latter connexion, the necessity to consider the effect of insecticides on beneficial insects and the need for knowledge of the ecological problems involved were stressed.

Part II of the Report gives an informative account of the many-sided work of the Committee. It describes the several schemes initiated or sponsored by

the Committee and a number of the experiments referred to are described in considerable detail in part III. Most of the work reported has already been noted in this *Bulletin*. It includes the activities of the Research Unit at Uganda the Colonial Insecticides Team which will shortly start work at Britain at Porton near Salisbury the malaria eradication work in Mawlaikotai Cyprus experiments completed or contemplated with aircraft dissemination of insecticides in East Africa, Zululand and Swaziland the use of helicopters in hilly and other difficult country defoliation experiments disinfection of stationary and airborne craft with non-inflammable and non-corrosive formulations of DDT and benzene hexachloride experiments with smoke generators against tsetse flies and various ecological and agricultural problems. Special notice is given to the Todd Insecticidal Fog Applicator in which the fog is produced by passing the insecticide under pressure into a hot air blast. Work on the *Simal* virus and onchocerciasis is described.

The need for work on insecticide research in Malaya and Nigeria was recognized and while staff cannot be provided at present the Committee is bearing the matter in mind and maintains co-operation with the field workers in an advisory capacity in the former country.

Liaison with overseas workers with various other relevant committees and with other organizations is wide and valuable and this is described at some length.

An appendix lists 13 publications of the Colonial Insecticides Research Unit. Only four of these were actually published the remainder were circulated in mimeographed form (their eventual publication would be of very great value).

The comprehensive nature and range of work set out in this Report amply justify it. Indeed justification were needed, the establishment of insecticide research as an important new and specific branch of disease control in man, animals and plants.

H. J. O'D. Burke-Gaffney

MARTINIQUE. Rapport sur le fonctionnement technique de l'Institut Pasteur de la Martinique en 1946 (MONTESIEUX E. Director) [Report of the Pasteur Institute of Martinique for the Year 1946.] pp 183 + iii.

This Report is divided into five parts. The first gives a statistical analysis of the laboratory examinations for the year. General medical routine investigations amounted to some 40 000. There were nearly 20 000 serological and 8 000 cytological examinations. The second part of the report discusses at some length the various infections encountered. These include intestinal diseases diphtheria malaria, rickettsial diseases, leprosy, tuberculosis and venereal diseases. The incidence of malignant disease is also discussed and there is a detailed discussion of haematological findings. Various other routine investigations are also discussed.

The third part is concerned with research on the enteric diseases anopheline mosquitoes of Martinique general entomology water bacteriology rickettsial diseases and brucellosis. The fourth part gives an imposing statement of the large quantities of biological products provided and the fifth deals with staff and administrative matters. Papers by members of the staff, dealing with some of the subjects mentioned, are listed.

A valuable summary in English of the Report is presented at the end. Points of special interest include the following:—

Typhoid fever is the most important endemic disease in Martinique both quantitatively and in its gravity. There were 399 cases in 1946 of which 360 were confirmed bacteriologically. Except for paratyphoid A and 4 paratyphoid B infections all of these were *Salmon typhi* infections. *Salmon* was found in the infected areas of the island (south and south-east) in 61 cases;

2 each were *P vivax* and *P malariae* infections and the remainder were *P falciparum*. The principal anopheline was *A aquasalis*, which is the local vector of malaria. *A argyritarsis* is also found, but is of little importance as a vector. There were 18 cases of *murine typhus* identified either by *Proteus* or rickettsial agglutination. 13 were from Fort-de-France and 5 from inland areas. Fifty-three new cases of *leprosy* were discovered. Seventy-four *tumours* were found in 236 histopathological examinations, of which half were malignant. Of the *helminth* infections, *Trichuris* accounted for one-third and hookworms and roundworms for about one-quarter each of 7,750 examinations of stools. *S mansoni* was present in 6 per cent. *E histolytica* was only found on two occasions, but *Giardia* was present in 301 specimens. One new case of *Syngamus* infection was found, being the third recorded in Martinique.

The Report is well presented and contains an abundance of information regarding the prevailing pathological and other medical problems in Martinique.

H J O'D Burke-Gaffney

EAST AFRICAN MED J 1948, July, v 25, No 7, 273-80 **The Native Authority Dispensary System in Tanganyika Territory** A Paper read at a Meeting of the British Medical Association of Tanganyika on the 20th February, 1948, by Dr A MCKENZIE, and Record of Subsequent Discussion [McNAMARA, H E, HILL, J F R, JACKSON, E, MCKENZIE, A (in reply)]

The Native Authority Dispensary System was developed in Tanganyika Territory from 1926 onwards as a joint effort by the Medical Department and the Provincial Administration. It was an attempt to give some form of medical attention to the people in remote villages. The Medical Department undertook the training of the dressers, and also acted in an advisory capacity, but finance, discipline and organization were the responsibility of the Administration. Dispensaries were built from Native Authority funds, and the scheme became popular with the people. The dressers were trained to treat minor ailments, and encouraged to send more serious cases to hospital, but by 1930, when there were 288 dressers, it became evident that some of them were attempting work beyond their powers. Increased inspection and more advanced training were instituted in some parts, but reorganization became necessary in view of the general inefficiency. The course of training was extended to 18 months in the Lake Province, where intensive instruction was possible, and to 3 years in other parts where no special teaching staff was available, and where the course consisted of 3 months' classroom work followed by 9 months' practical apprenticeship to an experienced dresser, repeated for the 3 years, or 18 months in hospital and 18 months as apprentice.

The Native Authorities in other provinces began to demand better qualifications in their staffs, and by 1939 it was necessary to review the situation once more. Then the training was concentrated in as few places as possible, and refresher courses were arranged. Nevertheless, the Medical Auxiliaries (as they were now called) did not give an efficient service, and there was a tendency for them to degenerate into dishonesty in their remote stations. This was the position at the end of the war, and McKenzie leaves it there. The question is whether to expand the service, as it has been expanded in the past, or to consolidate and improve the existing service without expansion for the present.

In the discussion following McKenzie's paper, CALWELL made the point that the Medical Department should control the service and that the training of dressers should not be too academic. He agreed with McKenzie on a policy of consolidation. The policy of expansion was urged by Mr HILL, Deputy Provincial Commissioner, who pointed out the need for treatment of people in the remote areas.

Charles Wilcocks

TRAPPEL, C. G. MARTIN J. D. ALLAN W. and other Members of the Department of Agriculture and the Forestry Branch with an Explanatory Memoir by C. G. TRAPPEL. *Vegetation-Soil Map of Northern Rhodesia*. 29 pp. 2 folding maps. 1947. Lusaka, Northern Rhodesia.

The work consists of two sheets of map of a scale of one to a million. It is about sixteen miles to the inch together with an explanatory text. It should be studied in connexion with ecological surveys published by Trapnell for North-west Rhodesia in 1937 and North-east Rhodesia in 1943. The information given relates to distribution of plants (particularly trees and shrubs) and soils in all about fifty types are distinguished. Some reference is also made to the present use of the different types of land. It is not proposed to review these documents. Attention is called to them because of their evident importance in relation to the ecology of tsetse they are probably as important in relation to the distribution of small mammals which is related to possible epidemiology of plague and other diseases. P. A. BAXTER

STRODE G. H. WHAYNE T. F. WILLIAMS L. L., Jr. SAPPERO J. J. & STETTER J. C. *Health Hints for the Tropics. Supplement to Trop. Med. Var.* [1948.] 20 pp. [17 refs.] Bethesda 14 Md. National Institute of Health.

Small publications giving hints on preservation of health, to intending travellers to hot countries are often asked for but not always easy to find. The authors have provided such a concise guide and have been able to condense a remarkably large amount of information in the small compass of 20 pages. They give good advice on climate, water, food, insects and the diseases they carry and immunization and conclude with a section of miscellaneous hints on skin diseases, effects of heat, rest, alcohol, clothing, housing, snakes and dangerous fish.

It is a good and well written pamphlet—very short, of course but full of good sense. Charles W. French

PONACH E. F. *Robert Koch*. 84 pp., 5 figs. & portrait. 1947. Berlin & Leipzig. Volk und Wissen Verlag GMBH. [1 Rm.]

In a book of pocket size (6×4×½ inches) and 84 pages, the author tells the very interesting story of the professional life of Robert Koch and, largely by quotations from a paper by Professor F. A. Heine ("Mit Robert Koch in Afrika und in der Heimat. *Ztsch. f. Hyg. u. Infektionskrankheiten* 1943, v. 125, 265) enables the reader to form some idea of Koch's personality. His outstanding ability was first generally recognized when in 1878 he demonstrated his experimental researches on anthrax to Ferdinand Cohn, the Professor of botany at Breslau University. From that time Koch carried on research in bacteriology and protozoology almost to the time of his death, in 1910. This life-story of constant labour and brilliant discovery at home and abroad is well told in this little book—an index of the persons referred to in the text, a glossary of technical terms and a short bibliography make a useful appendix to the narrative. J. F. CORSON

ARAUJO, A. *Historia natural de Venezuela*. (Introducción a una Geopolítica Venezolana) [Introduction to a Survey of Natural History in Venezuela.] *Rev. Geocombolomiana de Zootecnia Hig. Med.* 1: 1917 Oct.-Dec. 1. Nos. 10-11 1., 794-821

TROPICAL DISEASES BULLETIN

Vol 46]

1949

[No 2

SUMMARY OF RECENT ABSTRACTS*

II YELLOW FEVER

Epidemiology

DE AZEVEDO *et al* (p 1081) found yellow fever protective antibodies in the sera of the people of Portuguese Guinea, but as vaccination has been carried out in the area the significance of these protective bodies was usually doubtful, except in one area where vaccination had not been practised and in which one old person showed protective bodies

LEVI CASTILLO (p 703) has written an account of jungle yellow fever in South America during the period 1932-47, but this cannot be abstracted here

Actiology Animal Hosts Transmission

Because of the shortage of monkeys during the war STÉFANOPOULO and DUVLON (p 252) were led to investigate the effect of various strains of yellow fever virus on the guineapig. Virus 17D killed about 40 per cent of guineapigs when inoculated intracerebrally, and the authors think that these animals may be useful in detecting potential neurotropism, but the rhesus monkey remains the most suitable animal for this purpose

HOCKING (p 72) estimates the prevalence of *Aedes* by placing bamboo "pots" filled with water in the places investigated, and leaving them for 5 days. The number containing *Aedes* larvae provides a good index of prevalence

WADDELL and TAYLOR (p 72) have devised a method for comparing the transmitting capacity of *Haemagogus equinus* with that of *Aedes aegypti* under the same conditions. The ratio of transmission was constantly higher with *Aedes aegypti* than with *H. equinus*. WADDELL and KUMM (p 894) tested the capacity of *Haemagogus capricornis* to transmit yellow fever from infected marmosets, and found that its capacity to transmit by bite was not constant. In general a certain titre of virus in the blood was necessary for infection of the mosquitoes, below this, even though virus was present, infection did not take place.

WADDELL and TAYLOR (p 510) show that although under favourable laboratory conditions certain strains of jungle yellow fever virus may be maintained in marsupials and *Aedes aegypti*, strain differences of the virus may be great enough to affect cyclical passage, moreover, the infected marsupials did not infect mosquitoes which fed on them so well as marmosets. These

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 \ 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed

result suggest that more evidence is required before the marsupials (*Blasius nudicaudatus* and *Marmosa cinerea*) are incriminated as hosts of the virus: in one field enquiry no evidence was obtained that marsupials play a significant role in propagation of the virus.

CARNEY *et al.* (p. 892) have investigated the distance from their homes to which certain Brazilian monkeys travel. Their normal movements are within a few hundred yards of the home forest and do not explain the rapid and extensive spread of yellow fever through the sparsely wooded areas of Brazil. CARNEY and HUMA (p. 1030) show that when marked forest mosquitoes were released in the forest in Brazil most of those recaptured were taken near the point of release, but some were caught one kilometre away. In another experiment certain species of *Aedes* were captured up to 4.7 kilometres from the point of release: some of these were experimentally proved vectors of yellow fever.

LAEMERT (p. 894) tested the susceptibility of various neotropical rodents to infection with yellow fever virus: some were quite resistant, others showed circulating virus with some strains or developed protective antibodies. Details should be sought in the original.

Investigating the susceptibility of certain species of bats to yellow fever virus HIGGINS and PERLOW-ACORA (p. 810) could not recover virus from 254 bats infected: nor could they detect neutralizing antibodies after the infection.

Immunisation Control

In French West Africa immunization against yellow fever has been combined with vaccination against smallpox, both viruses being reconstituted from the dried state, pooled, and inoculated by scarification. It has been suggested that post inoculation encephalitic accidents occur more frequently after the combined vaccination, and LEPINZ *et al.* (p. 329) have attempted to obtain information by animal experiment, as to the possibility of increased virulence or neurotropism when the viruses are combined. The experiments showed no evidence of this, but as MACCALLUM points out in comment, these results do not settle the problem, because the agent producing post vaccinal encephalitis in man is not known.

Investigations by FOX *et al.* (p. 511) on the duration of immunity after vaccination with strain 17 D have given complete support for the 4 year certificate of immunity which is now in general use.

DE CAIRES (pp. 253-511) describes in detail the extensive organization developed in Georgetown, British Guiana, for controlling *Aedes aegypti* before the advent of DDT and shows how greatly the use of this insecticide has reduced the cost of control and the staff formerly needed. By using it as a residual spray in buildings *Aedes aegypti* has apparently been eradicated in Georgetown. GIGLIOLI (p. 485) has also shown that the domestic biting and resting habits of *Aedes aegypti* in British Guiana render the prospects of control by residual spray with DDT excellent.

LEGIERE RODRIGUES (p. 594) describes the measures taken in Chile especially at Arica, to control *Aedes aegypti*. These include the use of DDT and other measures: inspection of traffic and disinsection of aircraft etc.

Charles Wilson

MALARIA

HUFF, C G , COULSTON, F , COATNEY, G R , COOPER, W C , PORTER, R J ,
HAAS, V H , WILCOX, Aimee , LAIRD, R L , EWING, Frances M ,
COLEMAN, Nell Symposium on Exoerythrocytic Forms of Malarial
Parasites J Parasitology 1948, Aug , v 34, No 4, 261-320

I Introduction [HUFF] pp 261-3

Once it was known that certain species of *Plasmodium* had exo-erythrocytic stages in their life history, it was natural that active research in this field should be stimulated. This work received added impetus during World War II owing to the need for discovering prophylactic antimalarial drugs acting against exo-erythrocytic stages. It was to integrate the knowledge being acquired on various aspects in this field of research that a symposium was held on the subject.

Exo-erythrocytic stages are well known in certain species of *Plasmodium* parasitizing birds and, in one species, parasitizing lizards.

In the species *P. elongatum*, although cells of the erythrocytic series are preferred by the parasite, it can and does parasitize almost all cells of the blood and the blood-forming cells of the host. In the other species of avian *Plasmodium* which have been adequately studied, cells of the lymphoid-macrophage system are preferred although cells of other types may be parasitized. In *P. mexicanum* of lizards the potencies of both types described above are combined so that the parasite may invade any of the cells referred to.

In the species *P. gallinaceum*, *P. relictum*, *P. cathemerium* and *P. lophurae*, there are pre-erythrocytic stages of development in macrophages or related cells. The first stage developing from the sporozoite is called a cryptozoite and subsequent stages are called metacryptozoites.

If exo-erythrocytic stages exist in human and simian malaria parasites they are relatively fewer and less accessible than comparable stages in avian malaria. Some workers have claimed their discovery while others have searched intensively for them in vain. Indirect evidence of their existence is strong. Thus there may be long periods of aparasitaemia in the blood, followed by patent parasitaemia, and further evidence is afforded by the chemotherapy of the infections.

The discovery of exo-erythrocytic stages has given new lines of approach to chemotherapy by allowing study of the effects of drugs and of immune reactions upon the actual parasites, a procedure rendered easier by their large size. In addition, studies by the tissue culture method have been facilitated since some of the host's cells concerned are easier to grow and to keep alive than are erythrocytes. Other lines of study made possible are the changes produced by altering the species of host, or age of host, by transmitting infections serially from bird to bird through blood inoculation only, by serial transfer of infected brain material from chick to chick, and by similar transfer from chick embryo to chick embryo.

The author utters a warning on the limitations imposed on the contributors to the symposium. The latter gives an incomplete picture and does not answer all questions on exo-erythrocytic stages. It is further emphasized that results obtained with one or more species should not be considered necessarily applicable to all related species and that the findings in avian malaria may not have a parallel in human or simian malaria. The study of malaria parasites should be viewed as a whole and should be combined with consideration of the related genera *Leucocytozoon* and *Haemaphysalis*, which are almost exclusively exo-erythrocytic in their development.

II. A Search for Pre-Erythrocytic Stages of *P. vivax* and of *P. cynomolgi* [E. J. & COULSTON]. pp 284-74 1 fig. [10 refs.]

There is strong indirect evidence for the existence of pre-erythrocytic development of malaria parasites of man and monkeys. While such development has been demonstrated in reptilian and avian malaria, there was [when the author wrote] no conclusive evidence of its presence in mammalian malaria. This uncertainty led to the present investigations from this point of view of *P. vivax* of man and *P. cynomolgi* of the monkey. Although pre-erythrocytic development in these species was not demonstrated, an account is given of the material and methods employed.

In the case of *P. vivax* three strains were employed and in the case of *P. cynomolgi* one strain. For both species *Anopheles quadrimaculatus* was used as the insect host. Mosquitoes infected on man or monkey carrying gametocytes were dissected in a mixture of equal parts of distilled water and serum of the animal to be inoculated and the sporozoites in the glands supplied the material for inoculation. The experiments were divided into those in which *P. vivax* was inoculated into man and monkeys and those in which *P. cynomolgi* was inoculated into *Macaca mulatta*.

In the series of human experiments the following tissues were inoculated with sporozoites from the glands of 6 to 150 infected mosquitoes in each case —

Skin	on 4 occasions
Lymph nodes	7 "
Isolated veins	4 "
Bone marrow	" 2
Muscle	1

The examination of sections of the infiltrated areas for pre-erythrocytic forms was uniformly negative.

Further to verify the absence of pre-erythrocytic forms in the inoculated areas of skin or those subjected to bites of infected mosquitoes, the inoculated and bitten areas were excised and inverted subcutaneously into fresh individuals. None of these became infected although all the donors of skin became so.

Owing to the limitations imposed by human experimental material, attempts were next made to demonstrate pre-erythrocytic stages of *P. vivax* in monkeys. This attempt was based on the authors' demonstration that sporozoites of *P. gallinaceum* and *P. relictum* when inoculated into hosts in which no parasitaemia resulted, might yet produce pre-erythrocytic stages in these uncongenial hosts.

The monkeys used were *Macaca mulatta* *Papio papio* two subspecies of *Cercopithecus aethiops* and *Cercopithecus fuliginosus*. The infective material was inoculated into skin, bone marrow, liver and spleen. Again prolonged search for pre-erythrocytic forms yielded entirely negative results.

In a footnote the authors state that since submission of the paper the publication of the finding of pre-erythrocytic stages of *P. cynomolgi* and *P. vivax* by SHORT and GARNHAM and SHORT, GARNHAM, CORRELL & SWICK [this Bulletin 1948, v. 45, 383-482] led them to a re-examination of their material. With the finding of certain structures they presume to be cryptozoites of *P. vivax* in the liver of *Macaca mulatta*. The description of these must be awaited before comment can be made.

As a final experiment the techniques already used in the case of *P. vivax* were applied to *P. cynomolgi* with *Macaca mulatta* as the host. In this case internal organs as well as more superficial structures were subjected to inoculation of sporozoites. Biopsies made on the spleen, liver, bone-marrow and skin of six monkeys yielded negative results.

In the discussion, the authors emphasize the limitations imposed when working with human subjects, but reach the justifiable conclusion from their experiments that it is highly improbable that pre-erythrocytic stages of *vivax* develop in the skin or in cells of the reticulo-endothelial system, many of which are to be found in the inoculated areas.

The experiments with *P. cynomolgi* and *M. mulatta* were free from the limitations of the human experiments, but, owing to the small number of animals used, are not considered conclusive [see also this *Bulletin*, 1948, 45, 762].

III The Chemotherapy of Malaria in relation to our Knowledge of Exoerythrocytic Forms [COATNEY & COOPER] pp 275-89. [84 refs.]

Since GOLGI's (1893) suggestion that human malaria parasites may, at some stage, develop in cells where they are protected from the action of antimalarial drugs, evidence to this effect has accumulated. [It is stated that the exo-erythrocytic phase in the life cycle of avian malaria parasites was established by American writers between 1944 and 1948, but surely this achievement cannot be taken away from JAMES and TATE who, as the authors state, in 1937, established the existence of the exo-erythrocytic phase in *Plasmodium gallinaceum* (this *Bulletin*, 1937, v 34, 589, *ibid*, 1939, v 36, 339). The subsequent work, often brilliant in conception and execution, served to confirm and amplify the newer knowledge.]

Evidence of the activity of a drug against exo-erythrocytic parasites can come in various ways, depending on whether E E stages are known in the parasite being investigated or whether their presence is merely inferred from indirect evidence.

For a proper understanding of the report, certain terms are defined —

By *prophylaxis* is meant, permanent prevention of erythrocytic infection by drug action against any stage in the pre-erythrocytic cycle.

By *cure* is meant eradication of an established infection.

By *causal prophylaxis* is meant permanent prevention of erythrocytic infection by drug action during the early stages of a sporozoite-induced infection.

Very few workers have described actual morphological alterations of E E forms due to drug action and it is evident, therefore, that discussion on the chemotherapy of exo-erythrocytic stages of malaria must go beyond demonstrable visible effects of drugs on the parasites. There is much of this additional information available from studies on the prophylaxis and cure of both avian and human malarias.

Thousands of potential antimalarial drugs have been tested against various forms of malaria, but comparatively few have shown either curative or prophylactic action. Those which have shown such action, in varying degrees, come under six general categories: quinoline derivatives, sulphonamides, naphthoquinones, biguanides, acridone derivatives and a small miscellaneous group. Seventy-five compounds, discussed in the paper, are listed under these six heads.

From this formidable list, it is evident that the original paper must be consulted for details. These details concern chiefly the chemotherapy of avian and human malaria, since the data on simian malaria is still comparatively scanty.

The conclusions come to may be summarized very briefly as follows —

In avian malarias where E E forms have been demonstrated, some sulphonamides, naphthoquinones, biguanides, acridones, s triazines and a pyrimidine

compound act as causal prophylactics by action against pre-erythrocytic stages. One drug alone, a naphthoquinone, will cure an established infection in which exo-erythrocytic stages are known to occur.

In monkeys with *P. cynomolgus* infections, certain 8-aminoquinolines, with or without quinine, will cure established sporozoite-induced infections.

In human malaria, only the 8-aminoquinolines and the biguanides are active against the hypothetical exo-erythrocytic stages. The former are prophylactic and curative against both *P. falciparum* and *P. vivax*. Palatin, the best known biguanide, is apparently prophylactic against *P. falciparum* and partially so against *P. vivax* but it will not cure an established *P. vivax* infection.

IV The Chemotherapy and Immunology of Pre-Erythrocytic Stages in Avian Malaria [COULSTON & HUFF] pp 290-89 7 figs. on pl. [24 refs.]

Methods devised for studying the *in vivo* action of drugs on pre-erythrocytic stages of *Plasmodium gallinaceum* have been applied and the results are recorded.

Causal Prophylactic drugs

Cryptosporites.—Chickens were given sulphadiazine, sulphamerazine, sulpyrazine, a metanilamide and a naphthoquinone, by mouth in doses much greater than those required to prevent parasitaemia after the introduction of sporozoites. Cryptozoite development was little affected, either in character or in numbers, although in the cases given sulphadiazine, naphthoquinone and metanilamide a few damaged cryptozoites were seen.

Metacryptosporites.—The effect of the same drugs on the metacryptozoites was very marked, as evidenced by cytological changes, lack of development and decreased numbers. It is therefore considered possible that the drug acted on many of the cryptozoite merozoites only when released into the blood.

Suppressive Drugs

Similar methods applied to the suppressive drugs quinine, quinacrine, chloroquine, pamaquine and pentamidine gave different results. All caused morphological changes upon both cryptozoites and metacryptozoites but the proportion of parasites damaged was not so great as with the prophylactic drugs and there was no appreciable diminution in the number of metacryptozoites. The latter developed normally and produced metacryptozoite merozoites even to the extent of an occasional flooding effect. In the latter case small merozoites could be seen on or in erythrocytes and it is presumed that it is at this stage that the suppressive drugs became effective.

In the discussion following the points set out above various aspects of immunity in avian malaria are considered.

In blood-induced infections of *P. gallinaceum* the exo-erythrocytic stages appear late in the infection reaching a maximum by the third or fourth week, long after the maximum of the erythrocytic infection and its decline by which time the bird survives. This difference in time of the maxima of erythrocytic and exo-erythrocytic stages presupposes almost complete independence of the two components of the picture made up by a blood-induced avian malarial infection.

In the case of sporozoite-induced infection exo-erythrocytic forms develop prior to parasitaemia. The transition from these forms to the erythrocytic parasitaemia occurs between the 5th and 8th days and this must be considered the most important event of the life cycle because it enables the parasite to reach a new host via the gametocytes taken up by the insect vector.

These factors have an essential bearing on questions of natural or acquired immunity and on chemotherapy. The next point considered is the natural

immunity of various hosts to pre-erythrocytic forms of *P. gallinaceum*. Thus at one extreme the chicken shows complete susceptibility, while at the other extreme the canary shows complete immunity. Between these extremes, the duck shows partial immunity inasmuch as abundant pre-erythrocytic forms are produced, but no evident parasitaemia follows. The goose, turkey and guinea-fowl show a low grade partial immunity as evidenced by a transient parasitaemia followed by a subpatent infection. All these points indicate the existence of a barrier or threshold between pre-erythrocytic and erythrocytic parasitism and this is referred to as the tissue-blood barrier. In the cases given, it is best exemplified in the duck, where well-developed pre-erythrocytic development is not followed by patent parasitaemia.

The phenomenon of the tissue-blood barrier can be interpreted on the assumption that at least two antigen-antibody complexes are involved. In other words, natural or acquired immunity may be exerted against one or other of the two components of an infection, viz, the tissue stages and the erythrocytic stages.

Thus, in the case of an immunity acquired as the result of inoculation of sporozoites and erythrocytic parasites, the later inoculation of the homologous sporozoites will result in the production of pre-erythrocytic forms although a patent parasitaemia will not follow.

The conclusion is drawn that causal prophylactic drugs produce in susceptible hosts a similar effect to that produced by natural immunity in less susceptible hosts, while suppressive drugs attack the parasite at the point where they are released from the pre-erythrocytic forms to attack the erythrocytes, and therefore act in a manner similar to the tissue-blood barrier.

V Studies in Tissue Culture of Exoerythrocytic Schizogony in Avian Malarial Parasites [PORTER] pp 300-305 [16 refs.]

Attempts to grow exo-erythrocytic forms of avian malaria parasites were made early in the study of these stages.

Most of the earlier attempts at culture, such as those of HUFF & BLOOM [this *Bulletin*, 1937, v 34, 621], GAVRILOV, BOBKOFF and LAURENCIN [*ibid.*, 1939, v 36, 929] and HEGNER & WOLFSON [*ibid.*, 929] gave meagre success in spite of the fact that most of the parasites experimented with have exo-erythrocytic stages in macrophage cells and the latter grow readily in tissue cultures.

Much more successful results were obtained by HAWKING [*ibid.*, 1946, v 43, 410, 1947, v 44, 970] who used flask cultures and material rich in exo-erythrocytic stages. He utilized the technique of JACOBY [*J. Path. & Bact.*, 1944, v 56, 438] in which small coverslips are cemented by plasma clots to the bottom of a Carrel flask. The fragments of material containing exo-erythrocytic forms were cemented to the slips by plasma clots and the covering fluid was Tyrode solution with 20 per cent normal chicken serum and 2-6 per cent extract of chick embryos with the addition of penicillin.

Attempts at subculture gave unconvincing results although the primary cultures were infective to chicks.

Hawking's results have been largely confirmed by ZUCKERMAN [this *Bulletin*, 1947, v 44, 504] and the author of the paper under review. Attempts by various workers to infect cultures of normal tissues with sporozoites have been unsuccessful with the exception of some unconvincing results.

Up to the present time, studies based on the tissue culture technique are in an elementary stage and have supplied very limited information about the exo-erythrocytic stages of malarial parasites.

VI. Response of Exoerythrocytic Forms to Alterations in the Life-Cycle of *Plasmodium gallinaceum* [HAAS, WILCOX, LAIRD, EWING & COLEMAN pp 306-20 3 figs. [12 refs.]

JAMES and TATE in 1938 made the statement that "there is great irregularity in the period of infection during which the exo-erythrocytic stages are developed." Knowledge since acquired has shown that this apparent irregularity is based on varying responses to alterations in the life cycle either natural or artificially produced.

In the present report, three such general patterns of response are described. The first pattern (A) occurs when *P. gallinaceum* is serially transmitted from mosquito to chick. In this case the exo-erythrocytic forms are at their peak about the time when parasitaemia becomes evident. This is the pattern found under natural conditions of transmission; the exo-erythrocytic forms diminishing as the erythrocytic forms increase with the result that the vertebrate host lives long enough to produce the gametocytes which are necessary for the transfer of the infection to another host via the mosquito vector.

Pattern B is seen in chicks infected by blood inoculation and is therefore the parasite's response to an alteration in its normal life-cycle. In this pattern there is a rapidly mounting heavy erythrocytic infection causing the death of a large percentage of chicks. In the survivors exo-erythrocytic development is found about three weeks after the inoculation and often leads to death. A strain maintained in chick embryos by blood inoculation for 180 serial passages over a period of several years showed the same pattern when inoculated into clean chicks. Thus, out of 9 chicks inoculated 8 died of acute parasitaemia and one survived only to die later of exo-erythrocytic infection on the 132nd day after infection.

Pattern C is again the response of the parasite to an alteration of the normal life cycle. In this pattern there is a predominance of exo-erythrocytic forms sufficiently early in the infection to kill the host before erythrocytic forms become numerous or even before they appear at all.

This pattern has been more fully dealt with in the report with reference to the findings in brain-inoculated chicks and chick embryos.

Brain-inoculated Chicks—Brain suspensions containing exo-erythrocytic forms were inoculated intramuscularly into chicks. These chicks show pattern C development, i.e. they die on the 8th to 13th day after inoculation, with heavy exo-erythrocytic development in the brain but with a very mild parasitaemia, if any. The blood from these chicks if inoculated into fresh chicks produced a typical pattern C infection: heavy exo-erythrocytic infection and low parasitaemia. However if the blood was serially inoculated into chicks there was a gradual reversion of the pattern into the first phase of pattern B, with high parasitaemia and death before the appearance of exo-erythrocytic forms. Such converted B strains were very similar to B strains initiated by blood inoculation from the beginning, with the striking difference that there was an almost complete absence of gametocytes. This apparent disappearance must have been only relative because the blood was capable of infecting mosquitoes which were infective to other chickens, producing in them infections of pattern C.

Brain-inoculated chick embryos—The inoculation of infected brain material was made either into the yolk sac or on the chorio-allantoic membrane resulting in infections of C pattern. Embryos killed on the 6th to 12th days showed heavy infections with exo-erythrocytic forms and only mild parasitaemia. The curious feature in these infections was that the erythrocytic parasites were devoid of pigment. When the blood from embryos of this series was inoculated

into clean embryos and the infection of the latter maintained by sub-inoculation, there was a gradual reversion of the C pattern to B pattern in the embryos.

When embryos were infected by means of sporozoites, the C pattern was less clear cut. Thus SHORTT, MENON and IYER [this *Bulletin*, 1941, v 38, 413], in an embryo dying 11 days after sporozoite infection, reported an extremely heavy exo-erythrocytic infection and a moderate parasitaemia, so that an earlier examination would probably have revealed exo-erythrocytic forms before the appearance of any parasitaemia.

HAAS and EWING [*ibid*, 1945, v 42, 539], in embryos infected by mosquito bites, found infections resembling pattern A in some and pattern C in others, while in some an intermediate condition was found in which heavy parasitaemia and many exo-erythrocytic forms were simultaneously present.

When chicks are infected by sporozoites taken from mosquito-chick passages, pattern A infection develops, but when the sporozoites come from chicks of the blood-inoculated series, pattern C infections ensue.

It is thus seen that the pattern of infection is chiefly dependent on the source of the sporozoites.

Finally, it has been shown that C pattern of development can be obtained by suppressing erythrocytic forms by quinine and then maintaining the infection in serial passages.

H E Shortt

[For a full discussion of exo-erythrocytic schizogony in malaria, see also GARNHAM, this *Bulletin*, 1948, v 45, 831.]

CANAPERIA, G A & PATRISSI, T. La malaria in Italia nel periodo bellico e post-bellico. Considerazioni epidemiologiche e misure profilattiche [Malaria in Italy during the War and the Post-war Period. Epidemiology and Prophylaxis] *Riv di Malariaologia* 1948, Feb, v 27, No 1, 1-28, 8 figs & 1 map. English summary (4 lines).

This paper describes the trends of malaria morbidity and mortality in Italy since the beginning of the century, the excessive malaria mortality that marked the close of the first world war, the rapid decline in malaria morbidity that occurred during 1935-39 to the lowest level ever recorded, and the subsequent spectacular rise in malaria incidence. In 1945, there were recorded 49,731 primary infections and 362,376 relapses as compared with 55,453 total cases in 1939. Energetic measures are once more bringing the disease under control. Early trials with DDT have produced remarkable results and the widespread use of DDT is the outstanding feature of the five-year programme of control that has been adopted by the public health authorities.

Norman H Hut

JAFAR, M & IYENGAR, M O T. The Incidence of Malaria in a Deltaic Area of Lower Bengal between the Damodar and the Hooghly Rivers. *Indian J Malariaology* 1947, Dec, v 1, No 4, 441-67, 1 map.

This is a report of a malaria survey of a flat deltaic area of Lower Bengal comprising parts of the three districts, Burdwan, Hooghly and Howrah. There is a slight fall in the general ground level from north-west to south-east. The elevated parts have fairly effective natural drainage and contain no extensive collections of water, in spite of an annual rainfall of about 55 inches. The lower portion has very little natural drainage and contains extensive areas that hold water for several months of the year. Between November 1945 and February 1946 372 villages were surveyed and 25,632 children were examined. The overall spleen rate was 34.1 per cent. The proportion of plasmodial species in 87 positive blood smears was *P. falciparum* 62, *P. vivax* 28 and *P. malariae* 10.

Species of adult *Anopheles* captured in order of frequency were *A. souleyi*, *A. vagans*, *A. pallidus*, *A. acuminatus*, *A. hyrcanus* var. *nigerrimus*, *A. namusari*, *A. philippinensis*, *A. s. byssus*, *A. barbrostris* and *A. culicoides*. *A. philippinensis* is the chief malaria vector in Lower Bengal. It was found breeding in ponds with subaquatic vegetation and fairly clean water.

Malaria was very unequally distributed. The average spleen rate in the elevated dry areas was from 47 to 63 per cent. The low water-logged areas were comparatively free from malaria. In one of them the spleen rate was only 4 per cent. These results confirm the finding previously reported by BINGHAM that a high subsoil water level acts as a deterrent to the breeding of *A. philippinensis* [this Bulletin 1943 v 40 683 1945 v 42 625].

The area was surveyed in connexion with a proposed Damodar Flood Flood Control Scheme designed to improve agriculture by irrigation and drainage. The raising in the water table that is likely to result in parts of the area should result in a reduction of malaria prevalence. VAN DER PLIGT

YACOB M & SWAROOP S. Malaria and Spleen Rate in the Punjab. *Indian Medical Journal* 1947 Dec. v 1 No 4 460-69 3 charts

Every year since 1914 a spleen examination of male school children between ten years of age has been carried out in all parts of the Punjab in June before the beginning of the malaria season and in November toward the close of the malaria season. Some 68,000 children attending 490 schools in 270 localities have been examined each year. The very large mass of statistical information provided by these annual spleen surveys has been examined by the authors. They have not been able to show that fluctuations in spleen rates have any value in forecasting the incidence of malaria. (GILL advanced the view that a low spleen rate in the month of June, provided the other factors are favourable, is regarded, so far as communal immunity is concerned, as favourable to the occurrence of an epidemic during the ensuing autumn. See also this Bulletin 1945 v 42, 620.) VAN DER PLIGT

VAN GOOR, W. T. Onderzoek naar de miltvergroting bij schoolkinderen in het ressort Tjandjoer (April-Juni 1947) [An Investigation into Spleen Enlargement in Schoolchildren in the Province of Tjandjoer (April-June, 1947)] *Med Maandblad Batavia* 1948, Juli 1 v 24 473-83 1 map.

During the Japanese occupation of the Netherlands East Indies the anti-malarial measures in the province of Tjandjoer had been almost entirely relaxed. Much ground had been allowed to become fallow, vegetation was not cleared and planting regulations especially as regards rice together with irrigation schemes had fallen into disuse. Conditions were thus ideal for the breeding of *Anopheles acuminatus* and the spread of malaria.

It was decided to carry out a survey of spleen enlargement in schoolchildren in an attempt to assess the present prevalence of malaria. Some 3,600 children were examined in 52 localities and the spleens classified as absent (small—half way to the umbilicus), moderate (reaching to the umbilicus) and "large" (below the umbilicus). The proportions over the whole province were —

Absent	1,522 cases	40 per cent
Small	115	30
Moderate	973	28
Large	151	4

The average splenic index was thus 60 per cent For boys the index was 60 per cent, for girls 52½ per cent (only 3,116 cases were available for analysis)

The splenic index varied considerably in different parts of the territory On the high ground (up to 1,200 metres) it was of course lower, but even here reached 24 per cent In some areas, however, it reached 100 per cent

These figures are compared with previous years for certain areas For those where complete figures are available the average splenic indices were —

1919	1922	1931	1941	1947
90	67 5	11	5	47

Thus though much ground has been lost the situation is not as bad as it was thirty years ago

A L Winner

ANDREWS, J M What's happening to Malaria in the U S A ? *Amer J Pub Health* 1948, July, v 38, No 7, 931-42, 5 figs [40 refs]

The general decline of malaria in the U S A began during the last quarter of the 19th century Then the disease was widespread over the eastern two-thirds of the country During the present century the declining incidence has been interrupted every 5 to 7 years by seasons of increased transmission The last of these cyclic waves of increased transmission occurred in the mid-1930's By then endemic malaria areas had contracted to the south-eastern States Since that last period of enhanced transmission, malaria prevalence has steadily and continuously declined in the U S A The author considers in turn the possible influences that may have determined this remarkable downward trend

There has been no deterioration in the potentialities of the parasite-host-vector system of malaria transmission during the last twelve years changes have been quantitative rather than qualitative In certain areas, antilarval measures may have diminished malaria endemicity but it is doubtful whether such measures were primarily responsible for the regional decrease The reduction of domestic densities of anophelines by insecticides, by insect-proofing of houses and as a result of anopheline deviation by cattle is probably a more important causal factor Population movements from endemic areas of the south to malaria-free areas, and improved antimalaria medication have contributed to the decline Economic advance has stimulated the development of most of these factors

Control techniques are continually being improved If advantage be taken of the present favourable conditions, the complete eradication of malaria from the United States is within the bounds of possibility

Norman White

GREENWALD, Margaret, COCHRAN, J H & SCHARFF, D K Large-Scale Rearing of *Anopheles quadrimaculatus*, Say, at Orlando, Florida *Mosquito News* 1948, June, v 8, No 2, 50-56, 6 figs

In this paper the authors give a complete description of their equipment and methods of management of a large successful laboratory colony of *Anopheles quadrimaculatus* at Orlando, Fla., which is capable of a daily output of 40,000 adults, 5,000 larvae and over 100,000 eggs This colony has been developed from the original methods described by Boyd *et al* in 1935 The reader is given all information he is likely to need as to the sizes and kinds of equipment and the various daily routines Such detail cannot be summarized but the following points are of particular interest

In addition to an indoor unit totalling 975 square feet there is also, at Orlando, an outdoor unit of 40 rearing boxes maintained in a stream The authors have found that the ideal temperature for larval development is 80 to 82°F (26.5 to 27.5°C) and that exposure to daylight is not essential It is extremely

important that the amount of food given to the larvae, and the feeding time, should receive special and continuous attention. The cages of adults which are kept at 84 F (29°C.) should be protected from draughts, bright light and extremes of temperature. At Orlando the natural humidity is so high the humidity control in the insectaries is unnecessary. Eggs can be stored in a ice-box, where they remain viable for ten days. Some of the equipment and procedures are illustrated by photographs.

H. S. Loomis

NOZ, J. & MANN F., G. Disminución Invernal del anofelismo en Tarapacá (Great Reduction in Winter of Anophelines in Tarapaca, N. Chile). *Patologica* Santiago 1948 Dec. No. 5 3-12, 4 figs. on 2 pls. English summary

In the region of Tarapaca in Northern Chile, rain falls in the summer and *Anopheles pseudopunctipennis* breeds in the streams. With the advent of cold weather the rains cease and the streams dry up becoming a series of isolated pools. Perhaps because the water is stagnant the filamentous algae which appear to be the principal food of the *Anopheles* larvae die and masses of dead algae become invaded by putrefactive bacteria. Water becomes so foul that *Anopheles* larvae and many other insects and other organisms are killed in large numbers.

After winter when the temperature again begins to rise ice melts in the upper Andes so that the streams begin to run again. The filamentous algae grow and an abundant population of *Anopheles* larvae appears. We have endeavoured to summarize the facts; the authors have worked out an ingenious explanation which involves a consideration of water chemistry and many other matters.

P. A. D. Allen

DALEN OOR, L. Redges of *Bromelia pinguis* L. A Source of Mosquito Breeding in Haiti. *Mosquit. News* 1948 Sept. v. 8 No. 3, 109-110.

CLÉMENT R., GERBEAUX, J. & SATGE P. Trois observations parisiennes de paludisme acquis du nourisson. Endomyopéricardite dans un des cas. (Three Cases of Acquired Malaria in Infants in Paris: Endomyopercarditis in One Case.) *Bull. et Mém. Soc. Méd. Hôpitaux de Paris* 1948 Nos. 24/25 889-896 1 fig. [24 refs.]

The three cases of malaria described concerned infant of two, six and eleven months of age respectively. The first had recently arrived from the Cameroons but the other two had never been away from Paris. All three cases presented diagnostic difficulties. The youngest child had symptoms of acute enteritis and it was only on the ninth day of illness that *P. vivax* was found in the blood; he recovered. In the second child *P. falciparum* malaria complicated a diphtheritic rhinopharyngitis; the diagnosis of malaria was made too late to avert a fatal issue.

The third child died with endocarditis, myocarditis and pericarditis and a heavy infection of *P. falciparum*. Section of the myocardium showed an abundance of malarial pigment. Haemocultures had been constantly negative. A normal sedimentation rate and the blood counts appeared to negative a septicæmic origin of the cardiac lesions. The occurrence of a *P. falciparum* infection in an infant who had never been outside Paris is in itself a very liable happening.

Norman H. K. Lee

HANNS, A & MUGLER, A Le paludisme des rapatriés de Russie. Son apparition tardive Sa latence intercalaire [Malaria among Persons repatriated from Russia - Its Late Appearance and Prolonged Latency] *Bull et Mém Soc Méd Hôpît de Paris* 1947, Nos 34/35, 1033-7

The authors have had in their hospital in Alsace 26 patients suffering from *P vivax* malaria which had been contracted several months or a year previously in Russia. These men had been impressed into the German army, been made prisoners by the Russians and most of them had been interned in the concentration camp at Tambov where they had passed a year or eighteen months. Tambov is in a marshy malarious area near the centre of Russia. They were repatriated in the autumn of 1945 in a miserable condition. Their condition steadily improved after their return home till the return of the warmer weather, when malaria suddenly attacked them. In only 8 of the 26 cases was there any history of febrile episodes that might possibly have been caused by malarial infection.

The authors discuss the possible reasons for the prolonged latent periods in these cases and for the fact that few or any of them had suffered from clinical malaria in Russia. They advance the hypothesis that their state of extreme debility and malnutrition may have been responsible, it was only when they had regained a more normal state of health that their bodies were able to react against the malaria parasite.

Norman White

HANNS, A & MUGLER, A Le paludisme des rapatriés de Russie (Deuxième communication) [Malaria in Persons repatriated from Russia] *Bull et Mém Soc Méd Hôpît de Paris* 1948, Nos 24/25, 818-21

The authors describe difficulties in diagnosis that have been experienced in the case of sufferers from malaria who have been repatriated from Russia to Alsace where there is no endemic malaria. Many of these have been primary attacks of malaria after prolonged incubation periods. For the most part the cases have been mild. Certain patients with disquieting renal, cerebral or hepatic symptoms had organs that had been damaged by previous disease. The symptoms were protean. Lumbar pains sometimes extremely violent, severe headache, irregular fever, and dissociation of pulse and temperature were frequently observed. All infections were due to *P vivax*. Clinical attacks yielded promptly to quinine or mepacrine.

Norman White

MARCHIONNI, M Un caso di rottura spontanea della milza in malarico [A Case of Spontaneous Rupture of a Malarial Spleen] *Riv di Malariaologia* 1948, Feb, v 27, No 1, 41-6 [11 refs] English summary (2 lines)

This describes an unusual case of rupture of an enlarged spleen, the occurrence of which was not suspected until laparotomy revealed the true state of affairs. On admission to hospital the patient must have had a small subcapsular rupture of the spleen, which was not diagnosed. This haematoma seems to have enlarged slowly during the following night, causing the spleen capsule to rupture while the patient slept. The symptoms then suggested the perforation of a gastric ulcer, the pulse rate was only 90. When operation disclosed the nature of the lesion the patient's condition was too grave to allow splenectomy to be attempted. The laceration was sutured and plugged, and a drainage tube left in. The patient eventually recovered.

Norman White

MADRAS GOVT OF Soil Erosion—its Prevention and Control. pp. 22 14
158 figs. & 1 folding map. 1948. Madras. Govt. Press. (6 rupees.)

This book, compiled by the former Chief Engineer for Irrigation and the Heads of the Departments of Irrigation, Agriculture Forestry and Public Health, Government of Madras is intended primarily for departmental use and for teaching agriculture and forestry. Most of the figures are from photographs taken in Madras the United States of America and other countries.

In the final chapter on erosion and malaria, it is pointed out that the problem of erosion and its control is in fact one of regulating the flow of water and therefore has an important bearing on malaria. After an introductory account of malaria and its transmission some effects of erosion are mentioned by making ground uneven and by promoting scouring and intermittent flow in streams it causes pools to form and by increasing run-off from hills it flows lower land. An account of engineering methods of mosquito control, familiar to malarialogists follows. On page 153 varieties of mosquitoes would better be written as genera, and on page 160 the filling of all points perhaps refers to ponds.

To medical officers of health the main body of the book should be useful in showing what is being done to check erosion. They can then foresee any consequent increase of potential breeding places of mosquitoes for example in water held up by certain types of terraces and dams and can plan control measures accordingly.

D J Lewis

FLETCHER, O. K. Jr. Ducks as Mosquito Predators. *J. National Malaria Soc.* 1948 Sept. v 7 No 3 183.

During routine malaria control inspections on a plantation in Dougherty County Georgia, in the summer of 1946 the author noted that a certain pond had a particularly dense population of mosquito larvae especially those of *Anopheles quadrimaculatus* and, to a lesser extent of *A. crucians* and others. The pond measures some 1.5 acres in extent and the whole surface is covered with vegetation and floatage, thus lending itself readily to larval survival. Throughout the summer larval densities in this pond increased to a maximum of 35 per square foot of breeding area on October 1st.

A few days later a flock of 63 large white Peking ducks were turned into the pond to graze. At the next inspection ten days afterward not a single mosquito larva and no edible floatage could be found. It was evident that the duck had performed a thorough job of eradication and no more larvae were found as long as they remained there.

The persistence of large numbers of larvae in comparable ponds excludes seasonal decline as an explanation. Furthermore no larvicides had been applied to the pond during 1946. As this pond is the only important one within flight range of human dwellings on the plantation it would seem that the feeding activities of the ducks had made "an appreciable contribution to malaria control."

The only reference to such activities which the author has been able to find has been in a current naturalist's publication where it is stated that the Mallard Duck ingests substantial quantities of mosquito larvae. The present author points out however that predation of wild ducks on mosquito larvae are of little significance in the malarious regions of the south, since their sojourn there is largely restricted to the winter months. [But the use of such ponds, when they are present by domestic ducks might well be encouraged.]

H J O D Burke-Gaffney

FLORIS, M. Relazione sulla campagna antimalarica 1947 nella Provincia di Cagliari [Antimalaria Campaign of 1947 in the Province of Cagliari] *Riv di Malariaologia* 1948, Feb., v 27, No 1, 29-40, 5 charts & 1 map English summary (3 lines)

The detailed description of the antimalaria campaign of 1947 in the Cagliari Province, Sardinia, is of more local than general interest. Malaria prevalence was remarkably lower than in the previous year. In 1947 there were recorded 6,062 cases of malaria, of which only 993 were fresh infections. In 1946 there were 17,135 reported cases, of which 3,380 were fresh infections. Another remarkable contrast with previous years was the greater prevalence of *P vivax* than of *P falciparum* infections, positive *P vivax* films numbered 823 as compared with 611 *P falciparum*. These results are attributed to the DDT treatment of houses. It is interesting to note that fresh infections were most numerous in 1947 in the months of July and August. At this season agricultural activity is at its height and many country folk spend the nights in open country without any protection against the attacks of mosquitoes.

Norman White

BALL, E. G., MCKEE, R. W., ANFINSEN, C. B., CRUZ, W. O. & GEIMAN, Q. M. Studies on Malarial Parasites IX Chemical and Metabolic Changes during Growth and Multiplication *in vivo* and *in vitro* *J Biol Chem* 1948, Sept., v 175, No 2, 547-71 [23 refs]

This series of papers deals with the growth and multiplication of malarial parasites. The present report describes the chemical and metabolic changes which have been observed in the red cells of monkeys during the growth of *P knowlesi* *in vitro* and *in vivo*. Some of the results confirm those of earlier authors [For summaries of preceding papers, in which the techniques employed are described, see this *Bulletin*, 1945, v 42, 867, 1947, v 44, 17, 649, 1043]. The changes occurring have been based on those taking place in a standard number of red cells, and are correlated with both the number and size of the parasites present. As other authors have pointed out, parasites grown *in vivo* caused a large rise in glucose and oxygen consumption over normal red cells but it has not been observed to the same extent with parasites grown *in vitro*. The ratio of moles of glucose to moles of oxygen consumed was approximately unity. The glucose was mostly converted to lactic acid. There was a more constant rise in fatty acid and in the various phosphorus fractions in parasitized cells grown *in vivo* than in those grown *in vitro*, which the authors believe may be explained by the lack of certain nutrient factors in the culture medium. The increase in nucleic acid phosphorus partly identified as of desoxyribose type was noteworthy. It is believed that *in vitro* the parasite can synthesize nucleic acid from certain components if supplied, but whether it can synthesize all the purines and pyrimidines has still to be determined. Experimental evidence does suggest that adenine can be synthesized. It was not clearly determined whether the co-enzyme flavin-adenine dinucleotide was synthesized by *P knowlesi* *in vitro*, since normal monkey cells in similar circumstances can synthesize this substance. The generally accepted view is that the parasite converts at least some haemoglobin of the host cell to haematin. Quantitative estimations have shown that during its life cycle *in vivo*, *P knowlesi* destroys nearly all the haemoglobin of the host cell and retains the haematin formed. Comparable results were obtained *in vitro*, but in neither case was the mechanism of the degradation determined.

J. D. Fulton

out that a similar potentiation of effect would be of great value in bacterial infections and in human malaria. [These results obtained by combined therapy of paludrine and sulphadiazine are of great interest when considered in conjunction with the experiments of BRADY & MCCORMACK (see above) who found that a sulphadiazine-resistant strain of *P. gallinaceum* developed simultaneous resistance to paludrine. They also found that a strain long resistant to paludrine and maintained in contact with that drug was likewise resistant to sulphadiazine. The evidence so far available suggests the long contact of *P. gallinaceum* with paludrine was necessary before resistance to sulphadiazine develops.]

J. D. FARR

BRUM, D. L. Experimental Transmission of the "3M" Strain of *Plasmodium cathemerium* to the Duck and its Chemotherapeutic Suitability for Routine Antimalarial Screening. *J. Parasitology* 1948 Aug v 34 No. 4 531-533 graphs. [28 refs.]

The strain of *P. cathemerium* described here, which had previously been maintained in canaries was found to adapt itself readily to the duck host, but not to the chick. When 10^4 parasites per gm. weight were given intravenously the peak of parasitaemia occurred on the 4th day. The infection showed considerable virulence and produced marked anaemia, but virulence was not increased by more than 300 passages. Periodicity was of 24 hours duration and marked synchronicity was exhibited on the first and second day of infection but not around the peak of infection. The number of merozoites per segment on the 4th day was 6 to 24 with a mean value of approximately 12. There was marked destruction of parasites around the peak period and thereafter parasites rapidly disappeared from the blood. Erythrocytic stages of the parasites could not be demonstrated. In therapeutic tests the drugs were administered in the food and the birds were kept on a 4 hour light and dark schedule. Treatment was started 24 hours before intravenous injection with 1.5×10^4 parasites per gm. weight. The strain was not susceptible to sulphadiazine. The morphological changes induced in the parasites by standard drugs and others are described. It is suggested that the duck is a suitable host for use in antimalarial screening tests with this strain of parasite.

J. D. FARR

BLACKWATER FEVER

POURSIRES Y & MOUTARDEUR, G. Lésions histologiques de rein dans la fièvre bilieuse hémoglobinurique. Contribution à l'étude du mécanisme de l'anurie. Déductions thérapeutiques. (Histological Study of the Mechanism of Anuria in Blackwater Fever and its Therapeutic Implications. *Bull. Soc. Path. Exot.* 1948 v 41 Nos. 7-8 553-8.

One of the authors recently studied blackwater fever in French Equatorial Africa. In most of the cases discussed blackwater fever appeared during an exacerbation of chronic malaria. The clinical picture was characteristic—oliguria developing into anuria with final uraemia. In one case there was persistent severe anaemia with normal kidney function.

The histological work described in this paper is based on the examination of tissues from three patients who died in uraemia. About 10 to 15 per cent. of the uriniferous tubules contained compact plugs of a brown red mass staining brick-red with eosin and containing no free iron. These "plugs" were common in the excretory part of the tubules but were not seen in the

secreting portion where there was only some protoplasmic debris or an eosinophilic substance which was very little condensed. A striking feature was the retraction of the glomerular tufts with a corresponding apparent increase in the size of Bowman's cavity. In some glomeruli there was a cubical change in the epithelium of Bowman's capsule. The authors were struck with the absence of mesenchymal inflammatory lesions, either acute or chronic. There was venous congestion and oedema of the medulla and the renal blood vessels contained few red cells which were often "*perdus dans une substance hyaline*".

The authors conclude from the fact that the majority of the renal tubules appeared to be open and not obstructed by "plugs" that the "blockage" theory of the pathogenesis of anuria cannot be maintained. They suggest that the retraction of the glomerular tuft follows a vaso-constriction within the tuft, presumably reflex, which results in the failure of the filtration of plasma across the glomerular membrane. This failure of filtration would account for the anuria.

On the grounds of the possible reflex origin of anuria, the authors recommend the use of intravenous novocaine (without adrenaline) in oliguric and anuric cases. They suggest two or three injections of 5 to 10 ml of 1 per cent novocaine given slowly in the course of 24 hours. Hypertonic saline (10 per cent) may be administered simultaneously. In cases where this fails to produce diuresis, direct "infiltration" of the renal "pedicles" is suggested.

The authors state that intravenous novocaine has given extremely good results in cases of anuria. All cases cannot be cured by this method, but they believe that in blackwater fever, where anuria is so often fatal, this physiological therapeutic method should be used as a routine, accompanied by anti-haemolytic treatment.

[It is not quite clear whether the authors are referring to their own results in the treatment of renal complications of blackwater fever, or whether they are making a general statement when they say that intravenous novocaine has relieved cases of anuria. If they are indeed referring to blackwater fever, this paper is important because it is the first report of such treatment in that disease. The suggestion that the "renal pedicles" should be "infiltrated" seems rather drastic.]

The authors make no reference to the very large literature on the subject of acute renal failure which has accumulated in the last decade. The theory of renal anoxia, so like their own, appears to be unknown to them.]

B G Macgregor

LANGUILLON, J. Le facteur Rh dans la fièvre bilieuse hémogloburique [The Rh Factor in Blackwater Fever] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 470-73

The author discusses the theory that the Rh factor is concerned in the pathogenesis of blackwater fever [see this *Bulletin*, 1946, v 43, 533]. He points out the similarity between the clinical and pathological pictures of incompatible transfusion and blackwater fever, and refers briefly to the evidence supporting the view that the malarial plasmodium may act as an antigen. He suggests that the malaria parasite contains a substance capable of sensitizing Rh negative individuals in the same way as in transfusion with Rh positive blood, or an Rh positive foetus. This sensitization is increased by repeated attacks of malaria and eventually sets off a haemolytic crisis which appears clinically as blackwater fever. His arguments in favour of this theory are as follows — (a) Four settlers in the New Hebrides who developed blackwater fever were all Rh negative. (b) Blackwater fever is unknown amongst the indigenous population of the New Hebrides, all of whom, according to the author, are Rh positive.

(c) Cases of blackwater fever occurring in the same family could be explained on the grounds of the hereditary transmission of the Rh factor. Two examples of multiple cases of blackwater fever in one family are reported.

In the discussion following the presentation of this paper there are very interesting comments. GIRAUD pointed out that something like 800 aborigines had been examined and were all Rh positive. DISCOMCK thought the presence or absence of the Rh factor in human blood could not by any means be the cause of the development of blackwater fever. For example there was no blackwater fever in North Africa where malaria was highly endemic and the incidence of the Rh factor was the same as in countries where blackwater fever occurred.

B. G. Macdonald

TRY PANOSOMIASIS

FORD J. WHITESIDE E. F. & CULWICK A. T. The Trypanosomiasis Problem. Reprinted from *East African Agric. J.* 1948, Apr. v. 13 No. 4 187-241 (18 refs.)

The authors examine the problem of African trypanosomiasis as a whole. They recognize three lines of approach, through the trypanosome, the tsetse and by way of a broad ecological view. They try to avoid prepossessions, and have produced a valuable stimulating paper which has a new look.

The authors enter the subject by summarizing what is known of the trypanosome and the tsetse and calling attention to what is involved. They are interested in the possibility of immunizing against trypanosomes though the difficulties are stated. They emphasize the need for thinking quantitatively about fly populations and are prepared to discuss measures for reduction rather than extermination of tsetse. They are not tent right! that much more thought should be given to *Glossina* as a vector of trypanosomiasis.

The most original part of the paper discusses the "broad ecological approach which seeks so to modify the whole environment that it becomes inimical to the continuance" of trypanosomiasis. The authors focus attention not on individual organisms but on populations of cattle, men and fly and on their inter relationships. They suggest that wars and European penetration introduced new problems and diseases (rinderpest, smallpox). Old ways of using land and old pastoral customs were replaced by groundnuts, lorries, main roads and freedom of movement. This produced a vast biological disequilibrium. (There is left an impression that this part of the picture is not yet quite in focus. The authors have put together many fragments of evidence supporting their view and with further work it may become more concrete and precise. Certainly they have performed a service in calling attention to the need to go more time and study to the African habitats as an integral part of the epidemiology.)

P. A. B. Shaw

GEIGY R. Elevage de *Glossina palpalis* (Rearing of *Glossina palpalis*). *Acta Tropica*, Basel 1948 v. 3 No. 3 201-18 8 figs.

The paper carries on the story of the cultivated strain of *Glossina palpalis* which has been maintained for some time in Switzerland. The paper describes and figures the author's methods for feeding and maintaining his large culture of tsetse. The system is evidently remarkably efficient and appears to be capable of indefinite extension as the number of flies increases. It is labor saving for one laboratory assistant can look after a couple of thousand flies, giving three to four hours to it every day. In that time he can feed them and collect pupae and dead flies.

Several distinct cultures have been maintained. One of them contained ninety-eight females and a number of males, which were brought from the Congo in October, 1945, a few pupae were added to it soon afterwards. The numbers have twice increased up to fourteen to fifteen hundred, but in the hot summer of Switzerland they tend to fall, deaths occurring when the temperature in the cage passes 30°C for considerable periods. Similar figures have been obtained with the other strains.

The notes on biology repeat to a considerable extent what the author has already published P A Buxton

LAPEYSSONIE, T C L. Trypanosomiose humaine [Human Trypanosomiasis] *Bull Méd de l'Afrique Occidentale Française* 1947, v 4, No 3, 261-73

This is a general account, emanating from the *Centre d'Etude des Trypanosomoses Africaines*, on the subject of human trypanosomiasis, with particular reference to diagnosis and treatment under field conditions. It seems to be intended mainly as an introduction for new medical officers, and should serve sufficiently well for this purpose, though there are several misleading oversimplifications or statements which are of at least a controversial nature, as, for example, the following—It is stated that the pathogenic agent is essentially *T. gambiense* in West and Central Africa and *T. rhodesiense* in East Africa, it is claimed that cross-immunity tests are necessary in order to distinguish between these two species [implying the fallacious corollary that such tests can be depended upon to establish the identity of different strains of the same species], a possible reservoir in game and cattle is held to have been disproved for both the main forms of human trypanosomiasis.

There is little that is new in the more detailed sections on diagnosis and treatment, which evidently refer only to *gambiense* sleeping sickness. Tartar emetic has been abandoned, and atoxyl and orsanine are gradually dropping out. The view held generally by French field workers is repeated that tryparsamide is, in words quoted from VAUCEL, the least effective of trypanocides ("le moins bon des trypanocides"), that is, it does not destroy parasites in the lymphatico-blood system and should therefore be used *only* in second stage cases, or, if used in the first stage, it should always be preceded by atoxyl, suramin or pentamidine. Cases which do not respond to tryparsamide in the second stage are given a course of 20 injections, with an interval of 4 days between each injection, of 4 mgm suramin and 16 mgm tryparsamide per kilo body weight, the two compounds being administered simultaneously in the same syringe.

Measures directed against the tsetse fly are mentioned with faint enthusiasm, and in the briefest possible way in hardly more than a single page.

E M Lourie

BRUN-BUISSON, P, DIALLO, J, PIRIOU, L & CAILLE, J. Premiers essais de chimio-prophylaxie de la trypanosomiose humaine en Afrique Occidentale par la pentamidine [The First Trials of Pentamidine as a Prophylactic Agent against Sleeping Sickness in French West Africa] *Bull Méd de l'Afrique Occidentale Française* 1947, v 4, No 3, 257-9

These trials were carried out at the end of 1946 and in January 1947, in the sub-divisions of Gueckédou, French Guinea, and Sedhiou, Casamance.

In Gueckédou the trials involved 5 villages in 4 cantons where the Indices of New Cases were 1.4, 1.5, 1.9 and 3.4 per cent, respectively, and in Casamance in 2 villages in cantons where the Indices were 0.60 and 2.73 per cent, respectively. The inhabitants of these villages were divided into 2 groups, approximately equal in number and in sex- and age-distributions. The first

group received prophylactic treatment and the second served a control. Half the treated group received pentamidine in a single intramuscular injection of 3 mgm. per kilo the remainder receiving a single injection of 6 mgm. per kilo (with a ceiling dose of 300 mgm.)

About 6 months later no infections were discovered among the 100th treated persons while there were 19 among the 80th controls (2.1 per cent. infection rate).

This is described by the authors as the only method of protection applicable to forest regions and the intention is to extend it in the near future to the most heavily infected cantons in the sub-divisions of Sédou (Cassamance) in Guinée and VZérékoré (Guinea) and, if possible, to selected areas of the Ivory Coast.

E. M. Lewis

GOVIALES VICENTE D. Estado actual de la tripanosomiasis humana en la zona sanitaria de San Carlos (Fernando Poo). [Present Incidence of Human Trypanosomiasis in San Carlos, Fernando Pó.] *Med. Colonial Madrid* 1948, Vol. 1 v. 12, No. 5 283-323 9 figs. 1 map & 2 graphs. [55 ref.]

The trypanosome responsible for human sleeping sickness in San Carlos is *T. gambiense* and the vector *G. palpalis* for all those specimens captured during the period 1943-48 were of this species. In this district this trypanosome is pathogenic also for the guinea pig, the white rat, the dog and the pig particularly the dog and next to this the white rat. Wild animals, e.g. the antelope are believed to play a very small part as reservoir hosts. The author describes the clinical symptoms in man in considerable detail but the account contains nothing new. The Health Organization aims at a three-monthly examination of all the population. Treatment by Bayer 205 and trypanamide combined has given the best results. In early cases Bayer 1.2 gm. for each injection (consecutively for the first 3 days and thereafter at intervals of 2 or 3 days) to a total of 8-10 gm. according to the weight of the patient then, after an interval of 8-10 days trypanamide 1.2 gm. weekly to a total dosage of 20-24 gm. for an adult of 60 kgm. If the patient presents himself with nervous symptoms and there are definite changes in the cerebrospinal fluid trypanamide is given first then the Bayer and a return to the trypanamide until the fluid is normal careful look-out being made for toxic symptoms hepatitis, optic neuritis etc. The reduction of cases is shown by the figures for each year from 1933 to 1945. The following has been compiled from figures given in the text and shows a reduction from 15.4 to 0.4 per cent. of the population.

Year	1933	1934	1935	1936	1937	1938	1939
Population	4,851	5,747	6,552	6,250	6,500	4,918	5,215
Cases	748	370	332	56	234	201	169

Year	1940	1941	1942	1943	1944	1945
Population	5,916	6,750	6,569	6,169	6,448	7,575
Cases	11	123	66	83	48	31

H. Harold Scott

PELLEGRINO, J. Distribuição e índice de infecção dos triatomídeos transmissores da doença de Chagas no sudoeste de Minas Gerais. [Distribution and Infectivity Index of Triatomidae in South-west Minas Gerais.] *Rev. Brasileira Med.* Rio de Janeiro. 1949 Aug. 3 No. 8 555-64 3 figs. (maps) & 2 graphs. English summary.

Perusal of the spot-map which accompanies this article will demonstrate more clearly than pages of description the distribution of the eight species of

Triatomidae which are present in North-west Minas Gerais. The species are *Panstrongylus dasy*, *P. megistus*, *P. geniculatus*, *Psammolestes coreodes*, *Triatoma infestans*, *T. sordida*, *T. rubrofasciata* and a species undetermined, and the distribution is marked in over 40 municipalities and districts. The different localities in the various municipalities and the species found in each are also presented in a table. The numbers of insects examined—males, females, larvae and nymphs—of each species and the numbers found infected by *T. cruzi* were also determined. Three species only were found to be infected, viz *T. infestans*, *T. sordida* and *P. megistus*. Of 4,984 *T. infestans* examined, 1,365 (27.4 per cent) were infected, the numbers examined were distributed as follows, the numbers found infected being in brackets: males 1,894 (620), females 1,503 (499), larvae 166 (12), nymphs 1,421 (234). Of 233 *P. megistus* 11 were positive (4.7 per cent), 42 (3) males, 77 (3) females, 12 (0) larvae and 102 (5) nymphs. Of 51 *T. sordida*, 12 were positive: males 16 (1), females 30 (9), no larvae, nymphs 5 (2).

The author sums up by saying that among 48 municipalities studied Triatomidae were found infected in 34. Also that whereas in other parts of the State *P. megistus* and *T. sordida* predominate, in the south-west *T. infestans* is largely, in fact almost entirely, responsible for transmission of Chagas's disease.

H. Harold Scott

MUNIZ, J. Do valor da reação de precipitina no diagnóstico das formas agudas e sub-agudas da "Doença de Chagas" (Trypanosomiasis americana) [The Precipitin Reaction in the Diagnosis of Chagas's Disease] *Mem Inst Oswaldo Cruz* 1947, Sept, v 45, No 3, 537-49, 1 fig & 1 graph. English summary.

The precipitin reaction has, in the author's hands, proved most valuable in the diagnosis of early cases of Chagas's disease when symptoms are slight and liable to escape notice. Other methods of diagnosis take up much time, such as examination of thin and thick films of blood, cultivation, xeno-diagnosis, inoculation, etc. By the test here described a very small quantity of serum is needed, only 0.1 cc for the test and the same for a control, and the result can be read off in a couple of minutes in some instances. So far, the author has obtained positive results in every one of 32 cases. The test is of little value in chronic cases: in more than 200 such only 18 per cent gave positive results to the precipitin reaction. For chronic cases, therefore, other methods are better.

The material for the test is prepared as follows —

0.5 cc of a culture of the trypanosomes, 6-8 days old, is removed from the medium, washed in physiological saline and centrifuged. 1-1.5 cc formamide (Kahlbaum) is added and, after shaking, the suspension is heated to 150° in a glycerin bath for 10-15 minutes. It is then cooled and 5 cc of acid alcohol added. This is repeatedly shaken for 15-20 minutes and centrifuged. The supernatant fluid is placed in a fresh centrifuge tube and 10 cc of pure acetone added. After rapid shaking it is put aside for 10-15 minutes and again centrifuged. The fluid is discarded and the residue placed in a vacuum chamber to get rid of the moisture. To the precipitate are added 2-3 cc of 0.85 per cent saline.

For the test, 0.1 cc of the serum, clear and non-haemolysed, is placed in a small tube 3 mm in diameter, and the precipitinogen in the same quantity is introduced slowly down the side of the tube. In a positive case a turbid disk forms in 1-2 minutes at the junction of the fluids, but a limit of 10 minutes is interpreted as 4-plus, 10-20 minutes as 3-plus, after 30 minutes as 2-plus.

H. Harold Scott

BROWNING C. H., CALVER H. M. & ADAMSON, H. The Chemotherapy of *Trypanosoma congolense* Infection with Phenanthridinium Compounds etc. *J. Path. & Bact.* 1948 Apr. v 60, No. 2, 338-9

VIEWAKATHAN D. K. & BHATT H. R. A New Species of Protozoa met with in the Salivary Glands of *A. culicifacies* Giles, in the Course of Rectal Malaria Survey—*Trypanosoma kahranensis* Viewanathan and Bhatt (1948) *J. National Malaria Soc.* 1948, Sept., v 7 No. 3 207 11 1 fig

"A new species of protozoa, *Trypanosoma kahranensis* Viewanathan & Bhatt (1948) met with in the salivary glands of *A. culicifacies* in South India is described."

LEISHMANIASIS

LOZANO MORALES A. Aportación al estudio de la epidemiología del Kala-azar infantil. [Contribution to the Study of the Epidemiology of Infantile Kala Azar] *Rev. Sanidad e Hig. Pública* Madrid. 1948 Aug. v 46 No. 8, 781-4

In the Antimalaria Institute of Cáceres, Spain, the author has seen 38 cases of infantile kala azar (one table totals 39) in the years 1941-45—one was diagnosed by the finding of leishmanias in the peripheral blood, all the others by splenic or sternal puncture. The numbers in consecutive years are given as 7 11 9 5 and 7 respectively. Of the 38 there were 9 under 1 month old, 23 between 1 and 3 years, 3 between 4 and 6 years, 3 more between 7 and 10 years. These last were all girls, but sex plays little if any part as regards incidence of the total, 17 were boys, 21 were girls, and up to 6 years the figures were 17 and 18 respectively. Practically all the patients lived in or came from rural districts.

11 Harold Scott

GÓMEZ J. DE CISNEROS J. M. Contribución al conocimiento del Kala-azar en la provincia de Murcia. [Kala Azar in the Province of Murcia, Spain.] *Rev. Sanidad e Hig. Pública* Madrid. 1948 Oct. v 50 No. 10 1017-24 2 figs. on 1 pl. [37 refs.]

This contribution is mostly in general terms telling of the findings in smears made from the sternal marrow of the biochemical test of Chopra and Gupta, the formal-gel of Napier, etc. The authors then state that both the visceral and cutaneous forms of leishmaniasis occur in the Province—they have seen 30 cases in children and one in an adult of 73 years, all proved by sternal puncture and 20 cases of oriental sore. They place no great reliance on the biochemical tests except as pointers calling for confirmation by examination of the sternal marrow.

11 Harold Scott

CHAND A. GUPTA D. C. & CHITTANI P. N. Indigenous Kala-Azar in the Punjab. *India Med Gaz.* 1948 June. 83 No. 6 291-3

Two cases of kala-azar have been reported—one of which got infected in Lahore. Evidence in favour of possible indigenous infection has been produced."

BUSTAMANTE, M E Epidemiología de la leishmaniasis en América [Epidemiology of Leishmaniasis in the Americas] *Bol Oficina Sanitaria Panamericana* 1948, July, v 27, No 7, 611-18 [18 refs] English summary

An article of much interest and a plea for more systematic study of leishmaniasis and interchange of information. Speaking generally, the parts of America in which leishmaniasis is found are wooded, moist and warm, except parts of Peru in which espundia is common. Visceral leishmaniasis is most frequent in the equatorial wooded parts of Brazil, Bolivia, Paraguay and the Argentine. Barretto divides the *Phlebotomus* species into domestic, associated with man and domestic animals housed close by, as *P. argentipes* [an Indian species], semi-domestic, living outside the dwellings but feeding on the blood of man and domestic animals, as *P. intermedius* and *P. fischeri*, and sylvan, living in forested areas and only accidentally associated with man and domestic animals, as *P. noguchii* and *P. ayrozoai*. Of those named, the first three only are known to be natural vectors. [It appears that *P. fischeri* was infected experimentally with *L. braziliensis* once in 1941.]

Of 1,506 persons examined, mostly collectors of chicle gum, 11 per cent altogether were infected, 17 per cent were male adults, 2 per cent women and 0.7 per cent children. *L. braziliensis* was the infecting parasite. In 61 per cent the ears were the sites of lesions, in 15 per cent the arms. Wood cutters in Yucatan are much affected. A long list is given showing the nine possible vectors and the places where they have been reported and the proposal is put forward "That the Pan American Sanitary Bureau be requested to act as a center of information and coordination between the institutions and the investigators interested in the study of leishmaniasis, with the purpose in view of aiding in the formulation of a methodical joint investigation program in the Western Hemisphere."

H Harold Scott

SANCHIS BAIARRI, V & MARCO AHUIR, R Sobre el sero-diagnostico del kala-azar con el antígeno metilico tuberculoso [Sero-diagnosis of Kala Azar with Tuberculous Methyllic Antigen] *Med Colonial* Madrid. 1948, Nov 1, v 12, No 5, 279-82

Deviation of complement with the Witebsky-Klingenstein tuberculous antigen has been recorded in cases of kala azar. Not having this antigen at hand, the authors used the methyllic antigen of Boquet and Nègre. With this, 18 out of 20 patients, diagnosed by splenic puncture as suffering from kala azar, gave a strong positive, fixing 6-18 haemolytic units, the other two giving a weak positive, 1-3 units. None of a control batch gave the reaction. In the present paper eight cases are noted briefly. One patient, who had been clinically cured 5 months before, still gave a positive reaction (5 units). Subsequent examinations should show whether this patient has really been cured or is only exhibiting temporary improvement, another, recorded as cured a year before, gave a weak positive (1 unit). One other, with typical blood condition, gave a positive (3 units) although no leishmania were seen on spleen or sternal puncture. Another, suffering from acute myeloblastic leukaemic leukaemia, in whom no leishmania were found, gave a negative to the complement fixation test.

H Harold Scott

TRIACÃO, C Subsídios para o esclarecimento de alguns aspectos dos problemas do kala-azar [Aids to the Elucidation of certain Problems in Kala Azar] 127 pp., 1 fig [Numerous refs] 1948 Lisbon

In his preface to this work the author disarms criticism by stating that he deals with only a few of the problems of kala azar and that the form in adults

only is considered. [But later in the section dealing with the spleen, details of the different cells are given in 13 cases 3 only of which are in adults and the remainder infants.]

A few words will explain the general plan of the work which has necessitated a wide study of the literature of the subject. One new process has been removed and this will be referred to later. The author takes up various points in turn and gives in each case the development of knowledge with the passage of time and the records of research each chapter or section ending with a fairly full bibliography. He then, in the appropriate sections, notes how his own observations agree with those stated. After an opening chapter on Portuguese literature on kala azar sections on the pathogeny and morbid anatomy as to blood-picture, the bone marrow and spleen smears and the different cells of blood, marrow and spleen the anaemia and the chemical changes in the liver the flocculation reactions used in diagnosis and lastly cultivation of *L. donovani* are devoted to each of these in turn.

The only new matter recorded is another gel reaction which, like many discoveries of note, was of the nature of an accidental occurrence. The author was estimating the iron in the serum of two kala azar patients by Schales' method the first stage of which consists in treating the serum with 0.3N HCl 2 parts serum to 1 part acid for one hour. When after this lapse of time it was about to pass on to the next stage to his surprise he found the mixture "gelled". Repeating the process he found that this gelification occurred in 15 minutes. With the sera of other kala azar patients one clinically cured and giving Napier ++ did not gel with the HCl at the end of an hour but a much more viscid than normally. Another who was under treatment gave a Napier 3-plus and an HCl gel in 24 hours. Three others, after their treatment had ceased, gave a Napier 1-plus but only increased viscosity no gel with the HCl.

The author therefore standardized his results thus. Those giving a gel within an hour 2-plus, those within 24 hours 1-plus. Those giving increased viscosity but not a gel ±. In a table he compares the results in 18 cases 9 untreated, 4 under treatment 1 inadequately treated (presumably having left off treatment as this is listed separately from the under treatment patients) and 4 cured, by the formaldehyde method of Napier and his own HCl method. One under treatment one untreated, and one clinically cured were negative to both. One untreated was negative with HCl but 2-plus with formalol but ± with HCl. In general, the others all showed a reaction less marked than with Napier's method. The author concludes by saying in regard specimens that having carried out Schales's method of estimating Fe in the serum in patients suffering from various diseases he has observed 2-plus only in cases of multiple myeloma (in which the formalol gel gives 3-plus) otherwise having made thousand of serum-iron estimations by this method.

Up to the present we have never observed results similar to those in kala azar. The reaction we note as ± is not so strictly specific. We have observed it in cases of hepatic cirrhosis.

H. Harold Scott

PREVITERA, A. & BONGIARDO A. Nuovi dati sulla leishmaniosi viscerale canina a Catania. New Findings regarding Visceral Leishmaniasis in Dogs in Catania. *R. Italiana d'Igiene* 1948 July-Aug. v. 8 No. 4 317-17. (20 refs.)

The English summary appended to the paper is as follows:—

"After having given some statistics about internal Leishmaniasis of dogs in the Mediterranean basin the authors expose the result of their researches.

"In 82 rambler dogs captured in Catania in the period from June 1945 till June 1946 with a microscopic research in the spleen, they have observed the presence of *Leishmania* in 6 cases, that is a percentage of 7.1 per cent

"Such a percentage corresponds to about the same percentage observed in the same town in 1933"

ISU, Tze-huei & HO, E. A. **Canine Leishmaniasis in Honan** *Chinese Med J Shanghai* 1948, June, v 66, No 6, 324

"A dog naturally infected with visceral leishmaniasis is discovered in the same household with a kala-azar patient in Hsuehchang, Honan"

FEVERS OF THE TYPHUS GROUP

BARNES, A. C. ***Proteus OX19* Agglutination in Pregnancy** *Amer J Clin Path* 1948 Aug, v 18, No 8, 635-6

GRATCH [this *Bulletin*, 1944, v 41, 197] reported that *Proteus OX 19* was agglutinated by the sera of all of 505 pregnant women examined. This finding was of interest in relation to the interpretation of the Weil-Felix test and as a possible basis for a test for pregnancy. The present paper gives details of results obtained with the sera of 402 women, of whom 207 were pregnant. A commercial *OX 19* antigen was used, tests being made by a slide technique. A higher percentage of the sera from pregnant women (73.9 per cent) gave a positive result than those from non-pregnant women (41.6 per cent) at a titre of 1/20 or over. It is considered that the finding is not sufficiently constant to serve as an aid to pregnancy diagnosis, but that it may be important in relation to the diagnosis of rickettsial disease.

[The detailed figures now recorded are in close accord with those of NELSON and CRICKSHANK (this *Bulletin*, 1945, v 42, 363) who found agglutinins to *Proteus OX 19* with greater frequency in the sera of pregnant women than in normal sera, but not with such constancy or to such high titres as had been reported by GRATCH.]

J. C. Crickshank

LODENHAMPER, H. Beitrag zu Erfahrungen mit der Weil-Felix-Reaktion [Studies of the Weil-Felix Reaction] *Ztschr f Immunitätsf u Exper Therap* 1943, Nov 18, v 104, No 1, 1-18 [27 refs]

The author gives his own experience of the Weil-Felix test and a critical review of the recent German literature of the subject.

An interesting comparison is made of the titres observed in a series of tests carried out simultaneously on sera of patients suffering from fevers other than typhus with two strains of *Proteus OX19* supplied to the German Field Laboratories during the Second World War. The findings are shown in the table—

Titres		0	1-50	1-100	1-200	1-400	Total
Strain	Do	464	71	40	2	0	577
Strain	No	323	115	99	36	4	577

In tests carried out on typhus patients the titres were usually so high that practical difficulties rarely arose even when the titres observed were widely different.

Typhus patient who had been vaccinated against the disease a high titre at low titres or not at all but among non-vaccinated patients the reaction is regarded as diagnostic in almost 100 per cent of the cases.

Extraordinarily high titres were sometimes observed such as one of 1:160,000 in a serum whose reading was made after 24 hours and one in which the titre reached 1:409,600 after two hours.

The author like most other observers of the reaction makes little reference to the diagnostic significance of the low but rising titres observed during the early stages of the illness.

John H. D. Meyer

TRIFFTERER, Theresia. Zusammenhang zwischen der Weil-Felix-Reaktion und der Präzipitation des O-Antigens des *Proteus* *bazillus* \ 19. The Correlation between the Weil-Felix Reaction and the Precipitation of the O-Antigen of *Proteus* \ 19. *Ztschr. f. Immun. u. Exper. Ther.* 1943 Vol. 18 \ 104 No. 1 41-50 [68 ref.]

The first part of this paper consists of a very useful documented review of the literature dealing with the antigenic structure of *Proteus* \ 19 and other organisms. The bibliography contains 63 references.

The second part contains the results of a series of comparative tests in which typhus and other sera were submitted to the Weil-Felix reaction and to a precipitation reaction in which the antigen was a solution of a glucolipid extracted by BOULE from *Proteus* \ 19. The name glucolipid was given by BOULE *et al* [see *Bulletin of Hygiene* 1938, v. 11 589 1938 v. 13, 842 1939 v. 14 344] to water-soluble substances contained in various Gram-negative bacteria, including *Proteus* \ and consisting of the polymaccharide species of each organism combined with phosphates. The glucolipids are regarded as the O-antigens of the organisms.

In conformity with the findings of UICHA *et al* [ibid. 1938, v. 13 746] the author found that a fairly uniform correlation existed between the Weil-Felix titres of the sera and the maximum dilution of the glucolipid which produced precipitation when added to the sera.

Sera with Weil-Felix titres of less than 1:200 usually gave negative reactions with the precipitation test even with the strongest solution which was 1:2,500. Titres of 1:400 corresponded roughly with precipitation reactions with solutions of 1:25,000 and titres of 1:800 with reactions with solutions of 1:50,000.

The glucolipid solution was highly toxic to mice when given intracranially when previously mixed with immune sera having high Weil-Felix titres the toxic action was inhibited.

John H. D. Meyer

MORONES S. Tratamiento del tabardillo con el A.B.V. Treatment of Tabardillo with *Para*-aminobenzoic Acid. *Cien. Med. y Quim.* 1943 Apr. 30 74 Nos. 12, 73-7

In a series of controlled trials the author found that *para*-aminobenzoic acid given in the usual doses caused no significant benefit to patients suffering from tabardillo whose treatment was started after the appearance of the rash. The average day of the disease on which the first dose was given was 14.1 but have been the eighth. A definition given of the name tabardillo previously the disease was house-borne typhus. The failure of the drug when given late in the course of the illness is not surprising. MORONES *et al*. had a similar experience [see this *Bulletin* 1943 4, 201] John H. D. Meyer

PAYNE, E H, SHARP, E A & KNUDT, J A Treatment of Epidemic Typhus with Chloromycetin *Trans Roy Soc Trop Med & Hyg* 1948, Sept, v 42, No 2, 163-70, 1 plan & 2 figs on 1 pl

The authors have obtained remarkably successful results in the treatment of 22 cases of louse borne typhus with the new antibiotic, chloromycetin [see this *Bulletin*, 1948, v 45, 779]

The cases were seen at Puerto Acosta in the province of Camacho, Bolivia. Four of the patients "presented signs and symptoms of probable death," and five others "gave evidence of certain death," yet all made a rapid recovery. The day of the disease on which treatment was started is mentioned in only three of the cases, in which it ranged from the 6th to the 12th day.

In nine of the cases the temperature became normal within 24 hours, and in none of the others did the fever last for more than 54 hours after the first dose was given. The pulse responded with equal promptitude, and the patients usually "entered convalescence" within three days.

The dosage adopted towards the end of the study was 1.5 gm given by the mouth once daily for two or three days, this system gave as good results as were obtained in earlier cases in which larger doses were given over longer periods. Oral treatment was as effective as intravenous, but the response was delayed by eight to twelve hours, probably because the tablets used were excessively compressed and took several hours to disintegrate.

Intravenous treatment was by a solution containing 1.0 gm in each phial of 10 cc, the solvent being propylene glycol. The usual dose was 0.2 gm, given very slowly, and four or five such doses were given daily, usually in addition to oral treatment. The total amount of chloromycetin given to adult patients was usually 4.0 to 5.0 gm during the early part of the study, one patient, exceptionally, received 8.8 gm.

No toxic reactions were observed, on the contrary the authors state that "the rapid beneficial effect on the heart action suggests that chloromycetin has the additional virtue of being a myocardial tonic."

Among 50 untreated cases occurring in the same epidemic, there were 14 deaths, but although no details are given to show that these cases were strictly comparable the evidence produced by the authors amounts almost to proof of the great efficacy of the drug.

John W D Megaw

MARIANI, G Le piu recenti osservazioni in Italia sull' impiego del vaccino anti-dermotifico [The Most Recent Observations in Italy on the Use of Typhus Vaccine] *Ann d Igiene* 1948, Jan-Feb, v 58, No 1, 43-5

GRASSI-BERTAZZI, C Reperto di elementi rickettsioidi negli endoteli polmonari di ratti portatori di virus murino dermatofoso [Presence of Rickettsial Elements in the Lungs of Rats Infected with Murine Typhus] *Acta Med Italica* 1948, Sept, v 3, No 9, 228-31, 4 figs [20 refs]

The English summary appended to the paper is as follows —

"The author, during systematic research in 17 rats of the town of Catama, could demonstrate the existence of the virus of typhus, through inoculation in guinea pigs, notwithstanding the actual absence of signs of disease. In 5 of these 6 cases he could put in evidence, in the lungs, a high number of rickettsioid elements."

POMALES LEBRON A. ARROYA G. MORALES OTTERO, P. & LOTTING L.
 Les réactions de fixation du complément et de Weil Felix dans l'éryth
 typhus des rats sauvages à San-Juan et Santurce (Puerto-Rico). The
 Complement Fixation and Weil-Felix Reactions in the Study of Typhs
 among Wild Rats in San-Juan and Santurce (Puerto Rico). Arch. du
 Pasteur de la Martinique 1948 Jan., v. 1 No. 1 91-8

Between 7 December 1944 and 22 June 1945 the sera of 413 wild rats caught in San-Juan and Santurce were tested by the complement fixation reaction (epidemic typhus antigen) and sera of 251 of these rats were tested also by the Weil-Felix reaction. With the former test 54 per cent. of the rats gave positive reactions at unstated titres with the latter test 4 per cent. reacted at titres ranging from 1-25 to 1:1,600.

During the three months January to March 1945 there were 28 cases of murine typhus in the two towns whose combined population was 70,000 and during the three months April to June of the same year there were 7 cases, but the percentage of positive fixation reactions among rats was about the same in the two periods. Among full-grown rats (100-200 gm.) 6 per cent. of fixation reactions was 70 among the small young rats (25-50 gm.) the percentage was 42.

Among the 251 rats subjected to both tests 139 gave positive fixation reaction and 42 of these reacted also with the Weil-Felix test of the 117 rats that did not react with the fixation test 19 gave positive Weil-Felix reactions.

John B. D. Meyer

COCHRAN H. L. Successful Methods of trapping Trombiculids (Acarina) with Notes on rearing *T. deliensis* Walch. Bull. Entom. Res. 1945 1st v. 39 Pt. 2, 281-86 5 figs.

Some methods of trapping Trombiculid mites are described which are based on their reactions to light and warmth and their tendency to climb upwards. The details of construction are illustrated by drawings.

A field mite-trap for collecting unengorged larvae consists of a Petri dish containing a filter paper cone which is placed on the ground and covered with a black metal tray three feet square and three inches high. This cover has a two-inch circular hole in the centre which should be placed immediately above the paper cone. Specially shaped wooden battens screwed to the cover give it a rise from sides to middle of half an inch. A glass specimen tube 1½ inches in diameter is fixed, by means of a grooved rubber ring, half way inside a two-inch diameter tube. These tubes are put mouths downwards into the hole in the cover in such a way that the inner tube rests on the paper cone. This is the only source of light beneath the cover. Larval mites within the square yard enclosed by the cover go towards the light, climb the Petri dish and the cone and are trapped in either one tube or the other. The trap is left in position for four and a half to five hours.

Another method for collecting larvae is by using bait animals. The guinea pig and the golden hamster were found to be the most suitable animals. Wire cages, each containing two animals, are placed on the earth to form a circle leaving a space equal to the width of one cage between the cages. The cages are moved one space every hour until a complete circuit has been made. Before exposure the animal should be clipped short around the genital perineum and ears to facilitate rapid examination for larval mites.

A laboratory light trap was originally used in Assam for collecting replete larvae of *Trombicula deliensis* from laboratory rats. It was also used in England for recovering engorged larvae of *T. autumnalis* from the bait animals. The light trap consists of a square box big enough to hold two guinea pigs, one on each

the box is closed by a wire mesh door, fixed at the other end is a black paper funnel twelve inches long, tapering to an aperture one inch in diameter. A filter paper tongue is attached to the aperture and leads to a Petri dish containing water. When in use the box is raised at one end so that the larvae walk up a slight gradient towards the opening in the funnel, opposite which is a 25- or 40-watt lamp, nine inches away. Larvae have appeared on the filter paper tongue within three minutes of the funnel having been placed in position. For some purposes a specimen tube can be substituted for the filter paper tongue.

"Flagging" is a method of collecting larvae in the field, by trailing a coarse cloth over the ground, but it is considered unsuitable for survey work except in the absence of a field mite trap. This method probably collects only a small proportion of the larvae and the task of removing them from the cloth is very tedious, though the light trap could be used for this purpose.

Flotation is employed for collecting adult mites from soil. A soil sample is sprinkled into a sink containing warm water three inches deep. The soil is stirred twice for a minute and the adult mites are then picked off the water surface. After five minutes no more adults appear. This method is not suitable for recovering large numbers of nymphs as they are more fragile than the adults and more easily wetted. Field observations on the movements of adult *Trombicula autumnalis* in moist soil showed that they rise towards the surface when the air temperature is high and go deeper when the temperature is low. They also go deeper when the soil is dry and rise after rain.

For the rearing of nymphs for systematic purposes, engorged larvae are put into a cloth-bottomed metal cell $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter and an eighth of an inch deep, a coverslip is sealed with wax on to the top of the cell. The cell is then kept in a moist atmosphere in a Petri dish. When larvae show signs of undergoing metamorphosis the cell is lightly flooded, the nymphophanes which float off the cloth are picked out and placed singly in other cells from which the nymphs and their larval pelts are obtained and mounted on slides for microscopical examination in polyvinyl alcohol.

H S Leeson

WILLCOX, P H A Mite Typhus Fever in Assam and Burma, 1944-1946.
Trans Roy Soc Trop Med & Hyg 1948, Sept, v 42, No 2, 171-89
[34 refs]

Of the 493 cases studied, all but 17 occurred at Imphal and Palel during the six months, July to December, 1944, so that to all intents and purposes the description of the clinical findings refers to this outbreak.

The case fatality rate was 8.3 per cent, this was not high, considering that the patients had been greatly debilitated by wartime hardships in highly malarious areas and had usually been admitted to hospital after a trying journey lasting two days.

The author was struck by the close resemblance of the clinical and pathological features to those of louse-borne typhus.

Headache occurred in every case, there were mental changes in 95 per cent of the cases, enlarged glands in 90 per cent, chest signs in 75 per cent, and conjunctival injection in 68 per cent. A rash was seen in 77 per cent of the European, in 31 per cent of the Indian, and in 27 per cent of the East-African, patients. An eschar was seen in 20 per cent of the cases. The average duration of the fever was 17.2 days.

Numerous references are made to observations on wartime mite typhus by other authors, one of these is misleading—it seems to suggest that the outbreak at Ranchi in 1943 was mite-borne, whereas it almost certainly was tick-borne and is so described by BOWEN [see this *Bulletin*, 1948, v 45, 63].

John W D Megaw

VALLEJO-FREIRE, A. Febre maculosa no México. Cultivo de Rickettsia [Spotted Fever in Mexico. Culture of Rickettsia.] *Mem. Inst. Bacteriol.* 1947 v 20 1-11 8 figs. [23 refs.] English summary

Both versions of the title of this paper are copied from the index to the journal in which it appears. The spotted fever referred to is the form of the borne typhus indistinguishable from Rocky Mountain spotted fever.

A detailed description illustrated by six photographs is given of the cultivation of the rickettsiae by Cox's method. The technique and apparatus employed are clearly described. An Oswald oxy-acetylene blow pipe (for W 29 bico No 2) is used for making apertures in the shell for the asexual introduction of the infecting material into the yolk sac, and for cutting off a cap of the shell preparatory to the extraction of the incubated sac.

An interesting point is that the author has never been able to detect the presence of rickettsiae inside the nuclei of the cells in stained preparations, though the intranuclear localization of the organisms has been regarded as the chief point of difference between *Dermacentorinus* [Rickettsia] nuclei and the rickettsiae of the other fevers of the typhus group.

The original inoculum from which the cultures were prepared was obtained from blood, brain substance and tunica vaginalis scrapings of guinea-pigs infected with a strain of rickettsiae isolated by BERTAMANTE and VARELA from a patient in Mexico. The number of rickettsiae seen in stained smears of vaginalis scrapings became much greater after the fifth passage. Thus the seen in other spotted fever strains.

John H. D. Meyer

VALLEJO-FREIRE, A. Transmisão do vírus da febre maculosa mexicana por *Amblyomma striatum* Koch, 1844 [Transmission of Rickettsia of Mexican Spotted Fever by *Amblyomma striatum* Koch, 1844.] *Mem. Inst. Bacteriol.* 1947 v 20 107-12. English summary (5 lines)

The author has succeeded on one occasion in bringing about the experimental transmission of Mexican spotted fever rickettsiae from guinea-pig to guinea-pig by the bite of *Amblyomma striatum*. It has also demonstrated the presence of infection in the eggs of an experimentally infected specimen of the same species of tick.

The strain employed was the one used in the experiments described in the preceding paper.

John H. D. Meyer

LOCKE, R. F. & HEALING, R. J. The Veterinary Public Health Significance of Q fever. *J. Amer. Vet. Med. Ass.* 1948 Nov. 113 No. 440 444-7. 14 refs.

GUTSCHER, V. & NUTER, H. Ueber eine Queenslandfever Epidemie in Bremgarten (k. t. Aargau) [An Outbreak of Q Fever in Bremgarten (Aargau Canton, Switzerland)] *Schweiz. med. Woch.* 1948 Oct. 30 74, No. 41 1064-6. 2 figs.

A retrospective diagnosis of Q fever was made in the case of a worker in a furniture factory who had been attacked on 6th April, 1948, by an illness diagnosed as bronchopneumonia. His complement-fixation reaction for Q fever was positive at a titre of 1-840. On enquiry it was found that 59 of the 100 persons employed at the factory had been attacked by an influenza-like illness between 14th March and 23rd April. Most of the 34 former patients who were investigated gave histories of illness suggestive of Q fever and positive complement fixation reactions. None of the unaffected workers who were examined gave positive reactions.

An epidemiological investigation failed to reveal the source of the infection.

John H. D. Meyer

PARKER, R R, BELL, E J & LACKMAN, D B **Experimental Studies of Q Fever in Cattle I Observations on Four Heifers and Two Milk Cows**
Amer J Hyg 1948, Sept, v 48, No 2, 191-206

The purpose of these studies was to obtain evidence with regard to the mode of transmission of Q fever. Two lactating cows were successfully infected. One cow was inoculated with a yolk-sac suspension of *Coxsella* [*Rickettsia burnetii*] which was introduced into three of the quarters of the udder, one dose was given via the milk duct, another was injected into the body of the mammary gland of another quarter, and the third was injected subcutaneously over the gland of one of the two remaining quarters. Milk from the quarter inoculated via the milk duct was repeatedly found infected up to the 17th day, and milk from the quarter inoculated via the body of the gland remained infected up to the 40th day. Milk from the other two quarters was not infected.

Blood of this cow gave a positive complement-fixation reaction from the 5th day and the titre rose to 1-256 by the 7th day. The cow showed no signs of illness at any time.

The other cow was inoculated via the milk duct of one quarter with a yolk-sac suspension containing five million infectious doses for a guineapig, the milk of the inoculated quarter remained infected up to the 40th day, milk from the adjacent two quarters was not infected. The cow showed no signs of illness, and repeated inoculation of guineapigs with her nasal washings, urine and faeces gave negative results.

Four heifers aged seven to ten months were inoculated with infected material in the following ways: (1) spleen suspension of an infected guineapig was sprayed intranasally into one; (2) infected yolk-sac suspension was injected intravenously into another; (3) bran contaminated with infected yolk-sac material was given orally to the third animal, and (4) a suspension of infected guineapig spleen was introduced into the vagina of the fourth. Repeated inoculation of guineapigs with blood, nasal washings, urine, and faeces gave negative results, except that the urine of the animal inoculated through the vagina was infective on the 5th and 9th days, probably by contact with the original infected material. None of the heifers gave a positive complement-fixation reaction at any time.

Full details are given of the technique employed by the authors. The findings are regarded as suggesting that cows may become infected through the milk ducts, either during milking or through contact with bedding contaminated by infected urine. The need for further study of the problem is emphasized.

John W D Megaw

BARTONELLOSIS

RICKETTS, W E **Bartonella Bacilliformis Anaemia (Oroya Fever) A Study of Thirty Cases** *Blood* 1948, Sept, v 3, No 9, 1025-49, 12 figs [50 refs]

[A report of a careful study with results of much informative value] The author discusses the findings in 30 cases of anaemia with the presence of *Bartonella bacilliformis* in the erythrocytes. Details of repeated examinations of the blood of uncomplicated cases of bartonella anaemia are given in a table and records of six patients, illustrating different accompanying conditions, in one a reduction of red cells to nearly half a million per cmm, with intensive regeneration and exceptional macrocytosis; in another, early death on the 10th day with similar reduction of red cells, nearly all parasitized by *Bartonella*; a third died from a complicating thrombocytopenic purpura, a fourth from

the same although the parasites were disappearing from the corpuscles. In stage, when the organism is disappearing has been called the "critical stage" the bartonellae change from the bacillary to the coccoid form, the parasitised cells are fewer as are the numbers per cell the erythrocyte count goes, reticulocytes increase macrocytes decrease there is lymphocytosis and reappearance of monocytes and eosinophiles and a shift of the polymorphonuclear series to the right. In short convalescence seems to be setting in, but this may be deceptive complications arise and a fatal issue may occur due to intercurrent *Salmonella* infection from the intestinal tract with a general lowered body resistance.

To sum up *Bartonella* anaemia occurs in the invasive stage of the disease and not during the course of it the later forms which are seen in the pre-eruptive and eruptive stages are different morphologically and clinically and are due to haemorrhages intercurrent infections thrombocytopenia purpura and other causes. The anaemia is macrocytic in type often hypochromic with young granulocytes reticulocytosis even to 50 per cent. erythroblastosis and polychromatophilia—in short marked signs of blood formation. The polymorphonuclears show a shift to the left, with myeloblasts myelocytes and metamyelocytes present.

The prognosis is very grave of the 30 cases observed, 22 ended fatally. Fifteen suffered with intercurrent infection and 11 of these died, as did three of 15 who had no such infections. As regards treatment, some authorities have maintained that blood transfusion is dangerous because of the possible invasion of the new cells by the bartonella, but in practice patients may be greatly benefited by such treatment. Incidentally (though it is probably too late for remedy now) the author states that Oroya Fever is not an appropriate name for Bartonellosis or Carrion's disease, as *Bartonella* infection does not occur in the Peruvian city of Oroya.

II Harold Scott

YELLOW FEVER

LIXONIS, P., ROUSSEAU E. & COUTONIS C. Complément d'enquête sur la distribution de l'immunité antiamarile naturelle chez les indigènes du Congo belge. [Final Results of the Investigation of the Distribution of Natural Immunity to Yellow Fever in the Native Population of the Belgian Congo.] *Ann. Soc. Belge de Méd. Trop.* 1945, June 30 23, No 247-67 1 map

The medical laboratory at Stanleyville has been carrying out studies of immunity to yellow fever in the Belgian Congo since 1938 using the more protection test of Sawyer and Lloyd for estimating neutralizing antibodies in serum.

Most of the results obtained up to the end of 1941 chiefly in Province Orientale (including Stanleyville) have already been published in the *Bulletin* 1944 v. 41 1025 and the essential are included in the present summary.

Tests have been carried out on serum from 3 369 infants and 3 688 adults from 198 localities in 81 territories 17 districts and residences.

The regions from which only negative results were obtained are the regions at high altitudes. The results from the vast equatorial forest region indicate that the disease is of low endemicity there. The highest rates have been obtained in some parts of the lower Congo and in the north part of Ubangi and

Uele These areas are savannah interspersed in the forest galleries. However, similar high rates have not been found in similar savannah in the southern part of the Belgian Congo. There was no evidence of a recent epidemic in any region.

There were only 2 areas in which the disease had been present as recently as 1939, one 1938 and the rest in 1936 or previously, mostly before 1930.

In addition, serum from 2 of 3 chimpanzees and 1 of 3 cercopithecus monkeys had neutralizing antibodies for yellow fever virus. Serum from 3 cynocephalus monkeys, 1 cercocebus and 1 cebus were negative. *F O MacCallum*

See also p 172, HADDOW, The Mosquitoes of Bwamba County, Uganda VI Mosquito Breeding in Plant Axils

PERLOWAGORA, A & HUGHES, T P The Complement Fixation Test in Yellow Fever Epidemiology II The Development and Loss of Complement-Fixing Antibodies in Marmosets (*Callithrix penicillata*, *C jacchus* and *Leontocebus chrysomelas*) *J Immunology* 1948, Sept, v 60, No 1, 67-75 [11 refs]

It is known that complement-fixing antibodies for viruses do not remain in the serum for long periods after convalescence. This has been shown to be true in yellow fever infection in man and rhesus monkeys. It has been shown by virus isolation and serum neutralization tests in recent years that certain species of marmosets are infected with yellow fever virus in the wild state in parts of South America, where the disease is endemic. It is difficult, however, to tell the date of the infection by the presence of neutralizing antibodies in a single sample of serum. The authors have found that complement-fixing antibodies appear between the 15th and 30th day of the infection in marmosets, reach a maximum titre in 4 to 5 weeks and then gradually disappear. One-third of the marmosets had lost their complement-fixing antibody by the third month and all but one of 26 survivors were negative by the ninth month. This test, combined with the neutralization test of the animals' serum, can thus be used to determine the approximate time of infection with yellow fever virus in marmosets in nature. *F O MacCallum*

DENGUE AND ALLIED FEVERS

YAOI, H & ARAKAWA, S Studies on Dengue (Resumé) *Japanese Med J* 1948, Feb, v 1, No 1, 4-12 [12 refs]

This paper is a summary of 12 articles by the same authors, published during the years 1943-1946. Animal experiments were carried out on much the same lines as those described in the paper below.

By using very young mice for the earlier inoculations the virus became adapted to intracerebral transmission through adult mice, young guinea-pigs, rabbits, rats, and monkeys. In the earliest passages through very young mice the incubation period ranged from "several days" to as long as 17 or even 25 days but after repeated passages a *virus fixe* was obtained which killed adult mice in four or five days.

The virus was cultivated in tissue cultures and in chick embryos, and although the lesions of the chorioallantoic membranes described by SHORTT were 'hardly observed' the latter method was found specially suitable for the maintenance of the virus in a virulent form.

CHEN JEN C. & ZIA, S. H. Study of Fixed Rabies Virus propagated in the Brain of Guinea Pig Fetus. *J Immunology* 1948, Sept. v 60 No. 1, 17-21 [16 refs.]

In view of the equivocal results obtained by previous workers in culturing rabies virus by the conventional methods, the present authors attempted to propagate a fixed rabies virus in the developing foetal brain of the guinea pig *in vitro*. In this connexion they describe the successful outcome of the experimental work and show not only that the virulence of the virus remained unchanged (10^7 to 10^9) even after 16 passages but that the culture virus vaccine possessed an immunizing potency comparable with that of an adult brain vaccine. Moreover there is an advantage in using foetal brain as vaccine instead of adult brain—an advantage corroborated by the work of KABAT WOLF and BUZZER [see *Bulletin of Hygiene* 1947 v 22, 313], who state that foetal rabbit brain failed to produce any lesion in rhesus monkeys, while adult brain when given in large doses, almost invariably produced lesions. Although the amount of material available in the guinea pig foetus is necessarily small this difficulty might be overcome by employing for vaccine production the foetuses of larger mammals such as sheep or goats.

It is noteworthy that the authors who found phenol-preserved vaccine whether made with foetal or adult tissue to be much less protective than formalized vaccine are now engaged on a detailed comparative study of the effect of phenol and formalin on the antigenicity of rabies tissue vaccine.

G. Smart

FREUND J., LEPTON M. M. & PISANI T. M. Immune Response to Rabies Vaccine in Water-in-Oil Emulsion. *Proc Soc Exper Biol & Med* 1948, July-Aug. v 68 No. 3 609-10

The incorporation of inactivated rabies vaccine into water-in-oil emulsion enhanced the antigenic property of the vaccine as judged by the formation of neutralizing antibodies. Allergic encephalitis did not occur unless mycobacteria were added to the emulsion.

BIGGICOMON J. R. & LAT C. Les vaccinations antirabiques à l'Institut Pasteur en 1947 (Antirabic Vaccination at the Pasteur Institute in 1947) *Ann Inst P Pasteur* 1948, A ; 73 No. 2, 163-7

A statistical summary

LUSSICH J. J. Organización de la lucha contra la rabia en la República Oriental del Uruguay (Organization of Control Measures against Rabies in Uruguay) *Bolet Oficina Sanitaria Panamericana*, 1948, July v 27 No 7 624-6

In Montevideo during the period 1927-1936 incidence of canine rabies continued on an uncomfortably high level with the result that annually more than 1,000 bitten persons had to submit to anti-rabies vaccination. In 1934 the Sanitary Authorities realizing that the steps taken up to that time had failed to reduce rabies incidence among dogs introduced the following measures of control: (1) isolation and observation of animals suspected of rabies; (2) collection of dogs found wandering in the street and destruction of those not claimed by their owners; (3) organization of a service to identify animals which had run risk of infection by rabid dogs; (4) compulsory notification of all cases of rabies or of suspected rabies among animals and destruction of all such animals; and (5) compulsory vaccination of all dogs collected off the streets and returned to their owners.

Statistics show that, between 1st October, 1934—the date on which the new measures came into force—and 31st December, 1947, of 136,008 dogs collected on the public highways, 120,946 were destroyed and 15,062 restored to their owners after having been given a single injection of Lymeo and Dor's phenolized vaccine. It is noteworthy that not a single case of rabies developed among the 15,062 dogs vaccinated. That the control measures introduced in 1934 achieved the desired result, is evidenced by the fact that in 1936 the cases of canine rabies were but 57 per cent. of those of the previous year; that in 1941 the reduction as compared with 1935 was 97·7 per cent., and that since 1944 no case of rabies has occurred among animals in the Department of Montevideo.

Moreover, in order to prevent the infection of the interior of Uruguay with rabies, which still exists near the country's frontiers, the Government on 4th July, 1946, issued a decree whereby application of the prophylactic measures in force in the Department of Montevideo was extended to the whole territory of the Republic.

G. Stuart

PLAGUE

THOMPSON, H. V. Studies of the Behaviour of the Common Brown Rat (*Rattus norvegicus*, Berkenhout). I. Watching Marked Rats taking Plain and Poisoned Bait. 16 pp. 13 figs. [1948. London: Ministry of Agriculture and Fisheries Infestation Control.]

The author describes observations which he has made on wild brown rats (*Rattus norvegicus*) on a pig farm in England.

When it was put down regularly at one spot which was dimly illuminated by electric light. The area was watched by observers continuously for large parts of a number of nights in succession. After several nights of observation 13 rats were caught alive. Two of these died, eleven were marked with distinctive individual patterns clipped in the fur and released. On subsequent nights the eleven individuals were frequently identified visiting the bait. Frequent consumption of wheat while the 13 rats were present and also the period of their captivity, it seemed that the total rat population was 32 to 37, a figure which was confirmed by other methods. It is a new Cholera source, interesting that the author has developed a possible method of estimating the population of wild rats.

The watch continued every night after the eleven marked rats had been baited. With one exception they were frequently seen visiting the bait. Some of the differences were observed between individuals for instance, the number of visits that a rat pays to its feeding place per hour or per night. The author is satisfied that in spite of illuminating, trapping and watching the rats, the behaviour is not prejudiced and that the behaviour of the rats was not affected.

The purpose is not to do so much for the facts as it is but because it is a method which helps to develop a usual fresh point of view.

fatality rate. The table shows the results observed in septicæmic rats; these are classified in accordance with the number of colonies grown from 0.25 ml. blood cultured by a method described in the paper.

	Group I (1-10 colonies)			Group II (11-300 colonies)			Group III (over 300 colonies)		
	Cases	Deaths	per cent.	Cases	Deaths	per cent.	Cases	Deaths	per cent.
Serum ..	29	7	(24.1)	30	17	(56.6)	12	12	(100)
Sulphathiazole	41	9	(21.9)	61	23	(37.7)	30	23	(76.6)
Sulphadiazine	4	1	(4.1)	1	4	(19.0)	16	8	(50.0)
Streptomycin	1	0	(0.0)	9	0	(0.0)	11	3	(27.2)

Sulphapyridine gave less satisfactory results than the other sulphonamide; sulphamerazine gave much the same results as sulphathiazole, but the number of cases treated was small. Sulphadiazine was regarded as the best of the sulphonamide drugs, and streptomycin is found to be the most effective drug in the treatment of bubonic plague in the light of present-day experience.

The dosage of sulphadiazine usually employed was 4.0 gm. initially followed by 2.0 gm. four hours later and then 1.0 gm. every four hours till the temperature had remained normal for two days, but the maximum duration of the course was 10-12 days. Treatment with this and the other sulphonamides was oral when possible; parenteral administration was reserved for patients unable to swallow and it was considered advisable to give an initial dose of 2.0 gm. intravenously in every severe case.

[The above dosage differs from that recommended previously by SORRY and the author viz. 2.0 gm. every four hours (this *Bulletin* 1947 v 41 415).]

Streptomycin was given intramuscularly; the initial dose was two-thirds of a gramme then one-third of a gramme every four hours till the temperature remained normal for 24 hours. In severe cases the full initial dose was given every four hours till the temperature had remained normal for two days. The total dosage varied from 4.0 gm. to 25 gm. but the latter was needed in only one exceptional case. Two patients developed a temporary psychosis, and another had a mild dermatitis, otherwise there were no toxic symptoms. [See also this *Bulletin*, 1948 v 45 597.]

John H. D. Meyer

LESLIE

On J. H. Alberta: the only Rat Free Province in Canada. *Canadian Public Health*, 1948, Sept., v 39 No. 9 367-74 4 figs.

This is a preliminary note dealing with a study of the remarkable circumstance that rats have not yet succeeded in establishing themselves in the Province of Alberta in Canada.

The first invasion of Western Canada by rats is said to date from about 1900, since when a progressive extension of their range has occurred from Minnesota and the Dakota territory. The invasion is found to be arrested or retarded by mountain ranges and rivers and by the intervention of uninhabited areas; it is accelerated when overcrowding among rats compels them to wander in search of food. Rat-proofing is an important factor in preventing the entry of rats into a new area, but other control measures like trapping and poisoning tend to drive them out into adjacent uncontrolled areas and so to speed up the spread of the rats.

Large-scale programmes of rat exclusion and rat control are believed to have a prospect of success in excluding rats from the Province

Rats have often been reported from different places in Alberta during the past 40 years, but on each occasion they have been detected and destroyed, thanks to the high degree of rat-consciousness existing among the inhabitants

The author recommends the setting up of a rat-exclusion campaign in the strip of land on the west bank of the South-Saskatchewan River 50 miles east of the provincial border, he points out that the discovery, in 1939, of plague infection among prairie gophers (*Citellus richardsoni* Sabine) in the province indicates that the introduction of rats would create a serious risk of the spread of infection to man

John W D Megaw

CHOLERA

IN DER BEECK, M Die Epidemiographie der Cholera in Frankreich [The Epidemiography of Cholera in France] *Ztschr f Hyg u Infektionskr* 1948, July 16, v 128 Nos 1/2 228-42 8 figs [56 refs]

LITTLE, P & SUBBAROW, Y The Mouse-Protective Test as a means of determining the Inhibitory Effect of Chemicals on *Vibrio Cholera* *J Immunology* 1948, Oct, v 60, No 2, 299-302

"Mouse-protective tests were carried out against *Vibrio cholera* using fifty-seven different chemicals The chemicals were selected because of activity in *in vitro* tests against *Vibrio cholera* as reported by McKenzie and co-workers The only chemicals showing superior activity were 2-sulfanilamidopyrimidine and its 5-bromo, 5-chloro, and 4-methyl derivatives Animals having been protected by chemicals were immune when re-inoculated with *Vibrio cholera* The xanthene dye, pyronin Y, and the thiazine dye, new methylene blue N, showed slight activity"

DAWSON, C E & BLAGG, W The Effect of Human Saliva on the Cholera *Vibrio in Vitro* a Pilot Study *J Dental Res* 1948, Oct, v 27, No 5, 547-52, 2 figs

Investigations carried out in Egypt showed the presence of an antibacterial agent active against *V. cholerae*, in the saliva of normal healthy persons, activity varied considerably in the same individual at different times Saliva samples from cholera patients showed only slight activity or none "The properties of this agent may be summarized as follows in addition to killing cholera bacillus, it also kills typhoid bacillus, passes through a Seitz filter, is destroyed at 75°C in five minutes, is destroyed at 3,000 r p m in thirty minutes, is partially inactivated after twenty-four hour incubation at 37°C, is partially inactivated after fourteen days refrigeration at 8°C, and is completely inactivated by 1/800 N acid." It is considered that the active principle is a product of the salivary gland secretion and that it has the properties of an enzyme

J Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

YIN HUAN. Problems of Amoebiasis. *J. Chin J. Med. Sci.* 1948, Oct. 2, No. 10 641-51 [23 refs.]

A general review

CARRERA G. M. & CHANGUY G. W. Demonstration of Acid Phosphatase in *Entamoeba histolytica*. *Proc. Soc. Exper. Biol. & Med.* 1948, July 1, v. 68, No. 3 610-11 1 fig.

The presence of acid phosphatase in *E. histolytica* has been demonstrated by a modification of Gomori's histochemical method.

MELLO L. da S. A amebíase e o sinal do hipogástrico esquerdo subjéctivo. [The Left Hypogastric Sign of Amoebiasis.] *Rev. Brasileira Med. Rio de Janeiro*, 1948, July 1, 5, No. 7 516-19

In patients who have suffered from amoebic dysentery pain can often be elicited by palpation over the left hypogastrium along the descending col and sigmoid. The author here however refers to subjective pain in this region complained of when the patient undertakes some spontaneous exertion exercises dancing bicycling or children running about a pain felt at the side. He avers that even though faecal examination yield no positive sign of amoebiasis such may be found later and treatment for this condition often cures completely. The transitory nature and the spontaneity of the pain would seem to be the important characteristics for there are many other possible causes of pain in this region. Cases are referred to which illustrate the author's thesis.

H. Harold Sack

CLARK, R. H. P. BEHRENDT, Z. T. & JONES R. F. Pneumo-Peritoneum in the Diagnosis of Amoebic Liver Abscess. *Amer. J. Trop. Med.* 1948, July v. 28 No. 4 545-50 4 figs.

The apparatus consists of two bottles with rubber tubing, a water manometer and an adapter for the sterile tube and needle which convey the air to the peritoneum.

The patient is prepared by a prior hypodermic injection of morphine. The site of election for introducing air into the peritoneum is about 1 inch below the umbilicus and almost the same distance to the right of the midline. A 18- or 20-gauge needle is used. It is essential that the air be flowing through the needle at the time it is introduced into the peritoneum and the pressure should be maintained at about 10 cm. of water. This will prevent contact with the bowel and consequent injury. When the peritoneum has been entered there is a sudden drop of 5 cm. in the manometric pressure. During the time the air is introduced the pressure should be adjusted to 10 cm. of water and about 400 cc. to 1000 cc. of air would be given depending on the size of the patient.

A total of 70 patients has been studied. Those cases selected include—

(a) Irregularities of the diaphragmatic shadow in which pneumoperitoneum revealed the dome of the liver to be normal in contour.

(b) Changes in the contour due to amoebic hepatitis with adhesions between the liver and diaphragm.

(c) Amoebic abscess of the liver showing the cavity with air following aspiration of pus and pneumoperitoneum revealing the relationship of the diseased liver to the diaphragm.

(d) Carcinoma of the liver for comparison.

In the third group (c) one patient, an Indian male, is included. He had an amoebic liver abscess from which 4,600 cc of pus were removed by aspiration.

In this case, 1,000 cc of air were introduced into the abscess cavity. A pneumoperitoneum with 500 cc of air was performed. In the postero-anterior view the abscess cavity only was visualized, while in the lateral view there was evidence of adhesions between the liver and diaphragm. Further evidence of adhesions was seen in the right lateral decubitus view.

It was possible to show the amount of remaining liver tissue by the combined use of pneumoperitoneum and injection of air into the abscess cavity.

The advantage of pneumoperitoneum is well demonstrated in the diagnosis of a case of carcinoma of the liver which shows the carcinomatous nodules on the dome of the liver clearly.

P Manson-Bahr

TJONG NJAN HAN. Het tropische leverabsces [Tropical Abscess of the Liver] *Med Maandblad* 1948, Aug 1, No 25, 504-8 [14 refs] English summary

Twelve tropical liver abscesses occurred in men only between the ages of 20-50 years in Soekabumi, Netherlands East Indies. As regards race, five were in Chinese, six in Sudanese and one in an Ambonese. Eight of the abscesses were situated in the right lobe, four in the left. One ruptured into the abdominal cavity, another through the abdominal wall to form a tumour-like growth in the surrounding skin. In one a subphrenic abscess developed. Three caused a distinct bulging of the abdominal wall while two gave rise to a considerable abscess. The associated temperature was not high and in some it was normal, but the relatively increased pulse rate constituted a valuable differential diagnostic sign. A high leucocytosis was recorded in three cases, but in the others the leucocytes ranged from 3,000 to 8,000 per cmm. Amoebae or cysts were found in the faeces in 33 per cent.

In nine instances active amoebae were found in the pus and in one, it is emphasized, cysts of *E. histolytica* were present in the 'prune-juice' pus, as well as in the yellow pus.

In the majority of cases the liver abscess probably develops at least 4-5 years after the amoebic dysentery.

Treatment consisted of the evacuation of the pus, drainage and sometimes irrigation with emetine followed by a combined course of emetine injections with quinoxal (Atron) and iodoquinol by the mouth.

P Manson-Bahr

LUIS CARRILLO. Amoebiasis intestinal y alergias respiratorias [Intestinal Amoebiasis and Respiratory Allergy] *Revista Med Argentina* 1948, July 30, No 31, 1477-82 [20 refs]

An interesting record. The author notes that among 120 patients who were passing *E. histolytica* or its cysts there were 12 who suffered from symptoms of respiratory allergy, 4 with spasmodic attacks of asthma and 9 with other allergic symptoms: cutaneous, digestive, nervous, etc. Six cases are described fully. These may be summed up by saying that they showed the usual signs of allergy and tests were made with a large number of substances—dusts, pollens, milk, animal hair, vegetal substances, etc.—with varying results. The usual antispasmodics were tried with perhaps temporary but no permanent benefit. Usual examination having revealed the presence of *E. histolytica* or its cysts, treatment was prescribed and followed by Atron 105. In each case a good remission was obtained and in 1 was maintained.

H. Harold Scott

- BEEMER, L. M. SAMUEL, E. & SHEEDROW A. The Secondary Infection in Chronic Amoebic Colitis. A Clinico-pathological and a Radiological Study. *South African Med J* 1948, Oct. 9 v 22, No. 19 61 (17 figs. [28 refs.])

The medical histories of five cases of colitis seen in S. Africa are recounted in detail and, apart from suspicion on what appears to be flimsy evidence, the instance has it been proved, either by faeces examination, or by sigmoidoscopy that *Entamoeba histolytica* played any part in the causation of symptoms. It may be justly asked upon what was the title of this paper founded? The reader is left to infer that the radiographic appearances afforded by barium enemata were regarded as conclusive. If this is so then the whole *raison d'être* of the ground and the critic is left wondering what could have prompted the sweeping assertion that 'It is probable that although *Entamoeba histolytica* causes the original pathological lesion secondary infection alone is responsible for clinical symptoms. The criticisms which are directed to the radiographs which illustrate this paper are these—Small filling defects are produced in most forms of colitis but usually in Europeans the amoebic ulcerations are superficial and the actual lesions so small that no distortion of the mucosal outline is produced. This statement also applies to the irregular outline of the cone-shaped appearance of the caecal caecum on which stress is laid. This is seen in other forms of chronic intestinal disturbance, whilst the ragged outline of the transverse colon in fig. 4, and the saw tooth edge of the descending colon in fig. 7 are clearly those of diverticulitis. The hard fact emerges that except in the most advanced stages with extensive and deep ulceration and where anatomical alterations have been produced, no radiological picture typical of intestinal amoebiasis can be said to exist. P. Manson-Bell

- COUTELEN F., BIGUET J. & COCHET G. Étude morphologique et cytologique d'un flagellé nouveau *Trichomonas matrix* n. sp., parasite de l'intestin des colabridés *Natrix natrix* et *Natrix piscinus*. [Study of a New Flagellate *Trichomonas matrix* Parasite in the Intestines of Calabrian Snakes, *Natrix natrix* and *Natrix piscinus*.] *Bull. Soc. Path. Exot.* 1948 v 41 No. 7/8 533-5 13 figs. on 2 pls.

- COUTELEN F., BIGUET J. & COCHET G. La culture de *Trichomonas natrix*. Développement et longévité des colonies en fonction de la composition du milieu. [Culture of *Trichomonas natrix*. Development and Viability of Colonies in relation to the Composition of the Media.] *Bull. Soc. Path. Exot.* 1948, 41 Nos. 7/8, 539-8. [15 refs.]

- COUTELEN F., BIGUET J. & COCHET G. Températures léthales et températures optimales pour la multiplication de *Trichomonas natrix*. Évolution de pH des cultures en fonction de la présence d'amidon de riz. [Lethal and Optimal Temperatures for Growth of *Trichomonas natrix*. Evolution of pH in Cultures in relation to the Presence of Rice Starch.] *Bull. Soc. Path. Exot.* 1948 v 41 Nos. 7/8 539-43. [11 refs.]

LEPROSY

- ZANETTI V. Contributions à la connaissance de la lèpre au Congo Belge. Épidémiologie—évolution clinique—classification. [Epidemiological, Clinical and Taxonomic Study of Leprosy in the Belgian Congo.] *Bull. Soc. Belg. de Méd. Trop.* 1948 Mar 31 28 No. 1 104-46 3 graphs.

This is a detailed study of ten years' work in the Belgian Congo on the control of leprosy which brings out the following points from the experience

vessels and in the production of fibrous tissue. There is a condition caused by the authors pan-vascularitis with perivascular accumulation of lymphocytes and histiocytes crammed with lepra bacilli. There is a chronic interstitial neuritis. Large foamy cells are seen and many with still larger vacuoles. "Gravure cheese appearance" and giant cells and, terminally fibrosis and hyalinization.

Seeing that this condition of the nervous tissue is so marked in the lepromatous form, the authors are of opinion that the neural type as a term for a separate clinical variety should be dropped. *H Harold S-C*

FLUCHT H & CAMADA R. Réaction de Mitsuda Immunité antilepreuse et vaccination par le B.C.C. (The Mitsuda Reaction, Immunity to Leprosy and BCG Vaccination.) *Institut Pasteur de la Guyane et du Territoire de l'Elise* Publication N° 174 1943 May 4 pp. [11 refs.]

MEYER J & PLIVY E. Mlle. La séro-agglutination de Hollande chez 61 lepreux de la Guadeloupe. (Hollande's Sero-Agglutination Technique in 61 Cases of Leprosy in Guadeloupe.) *Ann. Inst. Pasteur* 1943 June 74 No. 511-12.

PEDROSO CRUCET J. Ausencia de prurito inducido en el diagnóstico de lepra. [Absence of Induced Pruritus in the Diagnosis of Leprosy] *Rev. Española de Leprología y Dermatología* Marianao Cuba. 1943 Apr v 1 No. 2, 203-4

In the test for leprosy by injection of histamine the weal produced is accompanied in the healthy skin by itching but not in the non-characteristic or tubercloid form of the disease. The author has observed that in negroes and those with a dark skin where colour changes on histamine injection are not distinct 5 per cent. formic acid gives a similar and even more marked effect. If one deposits a drop of the acid on normal skin and then pricks the skin with a needle through the drop a slight burning is felt then an erythema appears followed after a varying interval by an itching papule and very marked redness. In leprosy patients such a procedure results in the weal formation but no itching. Intracutaneous injection (0.01-0.02 cc. of the formic acid solution into healthy skin causes a marked sensation of burning lasting several minutes and due to the caustic action of the acid. This is absent in the anaesthetic skin of a leprosy patient. The author believes this to be a valuable test in those suspected of leprosy the colour of whose skin makes it difficult, perhaps impossible to determine the histamine reaction.

H Harold S-C

LU Shang Ho. On the Value of Superficial Nerve Hypertrophy in the Diagnosis of Leprosy. *Chinese Jour. Trop. Med.* 1943 Jan. v 1 No. 1 29-42 3 figs.

This paper deals with extensive examinations for thickening of superficial nerves in Chinese subjects for the diagnosis of leprosy. Those searched for include the supra- and infra-orbitals, great auricular, ulnar, median and radial, peroneal and the tibial. In 3,077 healthy children of 8 to 15 years of age the nerves of the arm and leg and the great auricular were more frequently felt and the infra-orbital least so. Among 8,990 healthy adults the results were much the same except that the supra-orbital nerve was more rarely affected. Thus it was found that such nerves can be felt in a great number of healthy persons and the numbers are larger in men than in women and children. Those on both sides are perceptible more frequently than on one side in both sexes.

goes on an antimonial is administered Adult worms, living and dead, and large quantities of ova pass out by the drain, which is left for 20 days, the tube is then removed and in a few days the opening closes The patient attends as an outpatient for gentian violet treatment as above and after 4 weeks the Fouadin injections are repeated

The author states that in the past three years he has treated in this way 12 patients with complete success and no relapses *H Harold Scott*

AUDOYE & DESSAUSSE Sur un nouveau cas d'infestation par la grande douve du foie "*fasciola hepatica*" [A Case of *Fasciola hepatica* Infestation.] *Bull et Mém Soc Méd Hôpit de Paris* 1948, Nos 26/27, 920-23

A "classical" case, followed up in Cherbourg for 4 years

CASTRO JENKINS, A Fascioliasis hepatica humana en Costa Rica (Presentación de un caso) [Human Fascioliasis] *Rev Kuba Med Trop y Parasit*, 1948, Aug, v 4, No 8, 160-61, 1 fig

This is said to be the first autochthonous case in Costa Rica

GALLIARD, H La distomatose intestinale humaine à *Fasciolopsis buski* au Tonkin [Human Infection by *Fasciolopsis buski* in Tonking] *Bull Soc Path Exot* 1948, v 41, Nos 3/4, 214-17

Infection of man by *Fasciolopsis buski* is relatively common in parts of China, Formosa, Siam, Borneo and Sumatra, Assam and Bengal, on the other hand, it is generally recognized as being very rare in Tonking

The author, with DANG-VAN-NGU [this *Bulletin*, 1942, v 39, 13] has reported 5 cases originating in Tonking In three cases the infection was discovered during post-mortem examinations, in one during a gastro-enterostomy, and in one by finding eggs in the stools and subsequently the adults after treatment with oil of chenopodium He now reports two other cases In one patient who suffered from alternate diarrhoea and constipation, eggs were found in the mucus that surrounded a constipated stool He was not successful in eliminating the adults, but the eggs diminished after treatment It was not possible to follow this case for long

The second patient was in hospital with jaundice and hepatitis he vomited a worm, numerous eggs were found in the stools, and at autopsy 3 worms were recovered from the duodenum and 3 from the jejunum

The author discusses the anomaly that in the routine examination of tens of thousands of stools these very characteristic ova have not been found and yet the infection, though rare, does exist Further, there is a great disparity between the infection in man and the pig In the latter it is relatively common in Tonking the author found 12 per cent and 47 per cent in March and December in Hanoi, and 11 per cent to 35 per cent in North Annam It is possible that the parasite is ill-adapted to man, but all the specimens he has examined show full development It is possible that there are two species, a common one found in the pig and a rare one found in man, but again the only difference he has found is in size, the specimens in man being larger This is however a common experience in parasitology and in a single pig there is a great variation in the size of the worms recovered

The most simple explanation for the rarity of this infection in Tonking is that the aquatic plants, on which the cercariae encyst, are eaten cooked and the envelope of these plants is not opened by the teeth as in other endemic areas, but opened with a knife

he must be supported by the administration. The most important method of education is by personal discussion with small groups of people or even individuals and the most powerful weapon in overcoming apathy (which, more than hostility is the main enemy) is persistent badgering.

Charles H. Cox

PESIGAN T. P. Schistosomiasis Reconnaissance in Northwestern Mindanao. *J. Philippine Med. Ass.* 1948 Sept. v 4 No 9 493-503 map (10)

The author who recently confirmed the existence of a focus of *S. japonicum* infection in South-eastern Luzon, Philippine Islands [this *Bulletin* 1948 p 622] was told by a physician that there were suspected cases in North-western Mindanao. He therefore made a tour of the area around Pangasinan Bay staying there for about 2 weeks and examining the faeces of 304 persons in the villages visited. The examinations consisted of 4 direct cover-slip preparations and in this way positive results were found in 111 of the persons examined. This figure should not be regarded as an indication of the incidence in the population as a whole since the persons examined had symptoms suggesting the infection but the rate is high in view of the fact that there had not been any previous confirmation of cases from the area.

Oncomelania quadrass were found in several places some of them in association with fork-tailed cercariae.

Endemic foci are most likely to be found in low level, wet plains, without dry season suitable to the cultivation of lowland rice. A map showing 4 types of climate and the known foci is given for the Philippine Islands as a whole.

Intestinal infection was found in 70 per cent, hookworm in 63 and Trichinella in 34 per cent. of the people examined. 7 patients had *Entamoeba histolytica*, 2 *Balanitidum coli* and 1 *Paragonimus*; a few other infections were also diagnosed.

Charles H. Cox

NARDONE P. M. La distomiasi sinense. Contributo allo studio delle distomiasi. *Clonorchis sinensis* nell'estuario dello Yangtze-kiang e nella città di Shanghai. (Cura chirurgica con fistola biliare terapeutica). [*Clonorchis sinensis* in the Yangtze-kiang Estuary and in the Shanghai District.] *Ann. d. Ist. Var. e Colon.* 1948, Jan-Apr v 53 No. 1 69-78. [17 refs.]

The only part of this article on infestation by *Clonorchis sinensis* which was new to readers of the *Bulletin* is that dealing with treatment. Hater-gentian violet has been recorded as beneficial in some cases but most workers have agreed that no satisfactory treatment is known. The author finds drug treatment unsatisfactory though antimonials such as Fovadin may help. The only treatment which he found really a failing was surgical. In early cases and with mild infestations he has obtained cure without relapse in 8 patients by the following method. Preliminary injection of Fovadin to test susceptibility and if there is no reaction 5 cc. are injected on alternate days to the tenth day or dose but probably the latter from what follows. Then gentian violet is given in capsules by the mouth at a total 13 gm. 40 mgm in 20 days and, after 10 days interval, another 10 phials of Fovadin followed, a further 10 by the gentian violet. All through, 6 tablets of Normo-heparin are given daily as a cholagogue.

In more advanced cases such treatment is insufficient and in view of the infestation ending fatally or of it producing cirrhosis or carcinoma, surgical intervention is called for. Drainage by duodenal sound is impracticable because this cannot be continued for an indefinite period. The author's procedure is as follows. With local anaesthesia he seals off and then opens the gall bladder and drains it externally by Pezzer tube. At the same time as the drainage

goes on an antimonial is administered. Adult worms, living and dead, and large quantities of ova pass out by the drain, which is left for 20 days, the tube is then removed and in a few days the opening closes. The patient attends as an outpatient for gentian violet treatment as above and after 4 weeks the Fouadin injections are repeated.

The author states that in the past three years he has treated in this way 12 patients with complete success and no relapses. *H Harold Scott*

AUDOYE & DESSAUSSE. Sur un nouveau cas d'infestation par la grande douve du foie "*Fasciola hepatica*" [A Case of *Fasciola hepatica* Infestation] *Bull et Mém Soc Méd Hôpôt de Paris* 1948, Nos 26/27, 920-23

A "classical" case, followed up in Cherbourg for 4 years

CASTRO JENKINS, A. Fascioliasis hepatica humana en Costa Rica (Presentación de un caso) [Human Fascioliasis] *Rev Kuba Med Trop y Parasit*, 1948, Aug, v 4, No 8 160-61, 1 fig

This is said to be the first autochthonous case in Costa Rica

GALLIARD, H. La distomatose intestinale humaine à *Fasciolopsis buski* au Tonkin [Human Infection by *Fasciolopsis buski* in Tonking] *Bull Soc Path Exot* 1948, v 41, Nos 3/4, 214-17

Infection of man by *Fasciolopsis buski* is relatively common in parts of China, Formosa, Siam, Borneo and Sumatra, Assam and Bengal, on the other hand, it is generally recognized as being very rare in Tonking.

The author, with DANG-VAN-NGU [this *Bulletin*, 1942, v 39, 13] has reported 5 cases originating in Tonking. In three cases the infection was discovered during post-mortem examinations, in one during a gastro-enterostomy, and in one by finding eggs in the stools and subsequently the adults after treatment with oil of chenopodium. He now reports two other cases. In one patient who suffered from alternate diarrhoea and constipation, eggs were found in the mucus that surrounded a constipated stool. He was not successful in eliminating the adults, but the eggs diminished after treatment. It was not possible to follow this case for long.

The second patient was in hospital with jaundice and hepatitis. He vomited a worm, numerous eggs were found in the stools, and at autopsy 3 worms were recovered from the duodenum and 3 from the jejunum.

The author discusses the anomaly that in the routine examination of tens of thousands of stools these very characteristic ova have not been found and yet the infection, though rare, does exist. Further, there is a great disparity between the infection in man and the pig. In the latter it is relatively common in Tonking. The author found 12 per cent and 47 per cent in March and December in Hanoi, and 11 per cent to 35 per cent in North Annam. It is possible that the parasite is ill-adapted to man, but all the specimens he has examined show full development. It is possible that there are two species, a common one found in the pig and a rare one found in man, but again the only difference he has found is in size, the specimens in man being larger. This is however a common experience in parasitology and in a single pig there is a great variation in the size of the worms recovered.

The most simple explanation for the rarity of this infection in Tonking is that the aquatic plants, on which the cercariae encyst, are eaten cooked and the envelope of these plants is not opened by the teeth as in other endemic areas, but opened with a knife.

he must be supported by the administration. The most important method of education is by personal discussion with small groups of people or even with individuals and the most powerful weapon in overcoming apathy (which is more than hostility is the main enemy) is persistent badgering.

Charles H. W. L.

PESIGAN T. P. Schistosomiasis Reconnaissance in Northwestern Mindanao. *J. Philippine Med. Ass.* 1948 Sept. 1. Vol. 9: 495-505. (map on 4)

The author who recently confirmed the existence of a focus of *S. muriei* infection in South-eastern Luzon Philippine Islands [this Bulletin 1948, # 622] was told by a physician that there were suspected cases in Northwestern Mindanao. He therefore made a tour of the area around Pangasinan Bay and there for about 2 weeks and examining the faeces of 304 persons in the area visited. The examinations consisted of 4 direct coverslip preparations etc. In this way positive results were found in 111 of the persons examined. This figure should not be regarded as an indication of the incidence in the population as a whole since the persons examined had symptoms suggesting the infection but the rate is high in view of the fact that there had not been any previous confirmation of cases from the area.

Oncomelania quadrasi were found in several places some of them buried with fork tailed cercariae.

Endemic foci are most likely to be found in low level, wet plains, without dry season suitable to the cultivation of lowland rice. A map showing 4 types of climate and the known foci is given for the Philippine Islands as a whole.

Ascariis infection was found in 70 per cent. hookworm in 85 and Trichinella in 34 per cent. of the people examined. 7 patients had *Endamoeba* 1 of 4, 2 *Balantidium coli* and 1 *Paragonimus*. a few other infections were also diagnosed.

Charles H. W. L.

YARDOVE P. M. La distomiasis sinense. Contributo allo studio delle sibiliosi da *Clonorchis sinensis* nell'estuario dello Yangtze-kiang e nella zona di Shanghai. (Cura chirurgica con fistola biliare terapeutica) [Clonorchiasis in the Yangtze-kiang Estuary and in the Shanghai District.] *Ch. J. Med. Nat. e Colon* 1948 Jan-Apr. 53 No 1: 69-78. (17 refs.)

The only part of this article on infestation by *Clonorchis sinensis* which will be new to readers of the Bulletin is that dealing with treatment. Heliotropis gentian violet has been recorded as beneficial in some cases but most workers have agreed that no satisfactory treatment is known. The author finds drug treatment unsatisfactory though antimonials such as Fouadin may help. The only treatment which he found really availing was surgical. In early cases and with mild infestation he has obtained cure without relapse in 8 patients by the following method. Preliminary injection of Fouadin to test susceptibility and if there is no reaction 5 cc. are injected on alternate days to the tenth day or dose but probably the latter from what follows then patients are given 10-15 gm in 21 days.

by W. K. E. L. daily as a cholagogue.

In more advanced cases such treatment is insufficient and in view of the infestation ending fatally or of its producing cirrhosis or carcinoma, surgical intervention is called for. Drainage by duodenal wound is impracticable because this cannot be continued for an indefinite period. The author's procedure is as follows. With local anaesthesia he seals off and then opens the gall bladder and drains it externally by Pezzer tube. At the same time as the drainage

oes on an antimonial is administered Adult worms, living and dead, and large quantities of ova pass out by the drain, which is left for 20 days, the tube is then removed and in a few days the opening closes The patient attends as an outpatient for gentian violet treatment as above and after 4 weeks the Fouadin injections are repeated

The author states that in the past three years he has treated in this way 12 patients with complete success and no relapses H Harold Scott

AUDOYE & DESSAUSSE Sur un nouveau cas d'infestation par la grande douve du foie "*Fasciola hepatica*" [A Case of *Fasciola hepatica* Infestation] *Bull et Mém Soc Méd Hôp de Paris* 1948, Nos 26/27, 920-23

A "classical" case, followed up in Cherbourg for 4 years

CASTRO JENKINS, A. Fascioliasis hepatica humana en Costa Rica (Presentación de un caso) [Human Fascioliasis] *Rev Kuba Med Trop y Parasit* 1948, Aug, v 4, No 8, 160-61, 1 fig

This is said to be the first autochthonous case in Costa Rica

GALLIARD, H La distomatose intestinale humaine à *Fasciolopsis buski* au Tonkin [Human Infection by *Fasciolopsis buski* in Tonking] *Bull Soc Path Exot* 1948, v 41, Nos 3/4, 214-17

Infection of man by *Fasciolopsis buski* is relatively common in parts of China, Formosa, Siam, Borneo and Sumatra, Assam and Bengal, on the other hand, it is generally recognized as being very rare in Tonking

The author, with DANG-VAN-NGU [this *Bulletin*, 1942, v 39, 13] has reported 5 cases originating in Tonking In three cases the infection was discovered during post-mortem examinations, in one during a gastro-enterostomy, and in one by finding eggs in the stools and subsequently the adults after treatment with oil of chenopodium. He now reports two other cases In one patient who suffered from alternate diarrhoea and constipation, eggs were found in the mucus that surrounded a constipated stool He was not successful in eliminating the adults, but the eggs diminished after treatment It was not possible to follow this case for long

The second patient was in hospital with jaundice and hepatitis he vomited a worm, numerous eggs were found in the stools, and at autopsy 3 worms were recovered from the duodenum and 3 from the jejunum

The author discusses the anomaly that in the routine examination of tens of thousands of stools these very characteristic ova have not been found and yet the infection, though rare, does exist Further, there is a great disparity between the infection in man and the pig In the latter it is relatively common in Tonking the author found 12 per cent and 47 per cent in March and December in Hanoi, and 11 per cent to 35 per cent in North Annam It is possible that the parasite is ill-adapted to man, but all the specimens he has examined show full development It is possible that there are two species, a common one found in the pig and a rare one found in man, but again the only difference he has found is in size the specimens in man being larger This is however a common experience in parasitology and in a single pig there is a great variation in the size of the worms recovered

The most simple explanation for the rarity of this infection in Tonking is that the aquatic plants, on which the cercariae encyst, are eaten cooked and the envelope of these plants is not opened by the teeth as in other endemic areas, but opened with a knife

He concludes that human infestation with *Fasciolopsis* is more frequent than was believed but that the infections being light escape attention, and that the species is ordinarily maintained by the pig and only affects man where the aetiological circumstances are particularly favourable. L. E. N. J. for

MALDONADO J. F. The Life History and Biology of *Platystrongylus jamaei* Kosak, 1910 (*Trichostrongylus Discocaulidae*). *Puerto Rico J. Pub. Health & Trop. Med.* 1945 Sept. v 21 No 1 17-39 17 figs. on 3 pls. [Ref. footnotes] [Spanish version 40-60]

VON BOXSCHKE B. Folic Acid in the Treatment of Pernicious Tapeworm Anaemia. *Diphyllobothrium latum* and Pernicious Anaemia. XI. *Acta Med. Scand. supplica* 1948, v 131 Suppl. 213 82-90 4 figs.

The author states that there is no report in the literature on the effect of folic acid (pteroylglutamic acid) in the pernicious anaemia due to *Diphyllobothrium latum* infection. He reports on 4 such cases treated with this substance. In three the diagnosis was certain as the subjects were young and all had free hydrochloric acid in the gastric juice at some time. The fourth patient (aged 57) had no free acid and may have been a case of "cryptogenetic" pernicious anaemia associated with the worm infection.

In all four there was a dramatic response to folic acid 1, 20 to 30 mgm per day for 7 to 10 days. There was a sharp reticulocyte response in 3 cases the highest being 31.1 per cent. on the 7th day and in all three there was a rapid rise in erythrocytes and haemoglobin. The worm cure was affected with Fibra 3.5 to 4.0 gm. at a later date. The removal of the worms had no effect on the rate of rise of the erythrocyte curves.

The author points out that it has previously been shown that the response of tapeworm pernicious anaemia is as good as that of cryptogenetic pernicious anaemia to liver extracts and stomach extracts by mouth but not to gastric juice and meat. He has shown that the patient with tapeworm anaemia secretes intrinsic factor but that the tapeworm checks the reaction between the intrinsic and extrinsic factors. It has however no effect on the combined anti-anaemic factor. He considers that it is probable that the tapeworm affects the conjugase which in normal person converts pteroylglutamic acid (vitamin B₁₂ conjugate) into pteroylglutamic acid (folic acid). L. E. N. J. for

McGILL, R. J. Cysticercosis resembling Myopathy. *Lancet* 1949, Nov 6 728-30 1 fig. 1 ref.

An account of 2 cases in Indian

ROMAN E. & MONTAUDO P. Evolution de l'éosinophilie au cours de l'infestation expérimentale de rats. Development of Eosinophilia during Experimental Strongyloid infection of the Rat. *Bull. Soc. Path. Ex. et Trop.* 1949, 41 Nov. 77, 543-8. charts

FINA H. A Helminth Survey from an Autopsy Series on Natives of Okinawa, with Comments on Complications of Ascaridiasis. *Amer. J. Trop. Med.* 1948, July v 21 No 4 383-8. 10 refs.]

In the course of 120 autopsies on natives of Okinawa, after H. invasion the incidence of helminth infections was studied by the author. He compares his results with the findings in the same or neighbouring areas (at autopsy of

y egg counts in the living) of BENJAMIN (U S Nav Med Bull, 1946, v 46, 95), STEINER (Arch Pathology, 1946, v 42, 359) and FRANKS *et al* [this Bulletin, 1948, v 45, 453]

In the present series, the author found 98 helminthic infections in 68 persons. The nature of these is shown in a table which also gives the figures reported by the authors quoted above. It is noted that hookworms were found in 15.8 per cent of the present author's cases, *Ascaris* in 25.8 per cent and *Trichuris* in 8 per cent. The average percentage finding of *Ascaris* by the previous three workers was about 44.

The author gives particular notice to findings relating to *Ascaris* and of the parts of the body in which they were found. *Ascaris* was directly responsible for 3 deaths, two from intestinal obstruction (each focus of the distended bowel showing a score or so of worms) and one from hepatic infarction, which it is claimed, is a newly described complication. In this case, an *Ascaris* was found triply folded in the left hepatic duct, which it had dilated. The surface of the left lobe of the liver beneath showed two dentate-shaped haemorrhagic areas, and the cut surface showed a friable haemorrhagic area extending to the inferior surface at the hilum. A small friable thrombus was present in the left branch of the hepatic artery near the dilated duct.

The author notes, and quotes the evidence of other workers to confirm his observation, that the biliary tract of the Okinawan could be dissected with comparative ease, and that the duct system is relatively dilated. He suggests that migration of *Ascaris* is facilitated by this relative dilatation of the duct system. Neither flukes nor calculi were found in any of the 120 cases.

Migration into the biliary tract was also observed in a second case, but without gross changes.

In the 31 cases of ascariasis, *Ascaris* was found at all levels of the gastrointestinal tract from the mouth to the anus. The worm burden varied from 1 to 50. Occasionally a worm was found in the larynx.

The presence of biliary tract invasion by *Ascaris* is discussed and references to it in the literature are given. Among the observers quoted is GIRGES [this Bulletin, 1935, v 32, 257] who, in addition, has listed 21 complications due to this nematode.

The author concludes that helminth infection is present in about 80 per cent of the living population of Okinawa, and that the incidence found at autopsy is about 60 per cent. About half of the population showed multiple infections.

H J O'D Burke-Gaffney

BEACH, E W. Genital Manifestations in Early Filariasis. *J Urology* 1948, Mar, v 59, No 3, 371-5

In Noumea, New Caledonia, a Marine battalion of the U S forces which had come from the Russell Island campaign and had previously been trained in Samoa was surveyed in connexion with a symptom complex from which 160 of 385 men were suffering. This was eventually shown to be due to filariasis.

The condition was characterized by recurrent attacks of lymphangitis and lymphadenitis. The former was often descending or centrifugal in type. Recurrent attacks caused thickening and nodosity of the lymph vessels and enlargement and tenderness of the glands. There was no great prostration and no pyrexia. The glands commonly involved were inguinal (in 147 cases), femoral (108), epitrochlear (56), and axillary (132). The brachial lymph vessels were involved in 78 cases.

Thirty-seven men showed genital involvement. Acute vasitis or funiculitis was most common and occurred in 19 cases, in 3 of which it was bilateral. It began suddenly with pain and tenderness in the structures near the internal

ring and in a matter of hours had rapidly descended through the urethral canal and into the scrotum." There was apparently considerable thickening of the vas. In the recurrent cases the thickening was noted irregularly along the course of the vas. Biopsy showed that the vas itself was not actually thickened but that there was involvement of the surrounding tissues. Epididymis was usually not involved, but a characteristic finding was a "rolled up dough-like mass of tunica vaginalis" just beneath the globe testis which persisted after the attack subsided. The testis on the affected side was tense, swollen and very sensitive. There was an increase of hydrocoel fluid on aspiration the fluid was clear and did not contain microfilariae. The attack of funiculitis usually lasted 3 to 4 days. Microfilariae were found in the testis around the vas in 3 out of 5 biopsies.

[The parasitological aspects of this paper should be accepted with caution since it includes the two following statements: "It is remarkable to examine a blood smear from a native to find the field literally alive with squaring adult forms" and "Neither the presence of the adult worm nor the microfilaria had ever been demonstrated in the tissues of a white man." From the context however this last statement might be taken to refer only to the series under review.]

L. E. Nisbet

HAWKING F., SEWELL, P. & THURSTON, June P. Mode of Action of Hetrazan in Filariasis. *Lancet* 1948, Nov 6 730-31

In cotton rats infected with *Litomosoides carinii* the adult worms reside in the pleural cavities while the non-periodic microfilariae float in the peripheral blood. When these rats are treated with Hetrazan in doses of 25 mgm. per 100 gm. intraperitoneally the numbers of these embryos in the peripheral blood diminish. When, however 8 mgm. per 100 gm. are injected intravenously this diminution is extremely rapid—80 per cent. disappear in one minute and over 90 per cent. in two but even after the most intensive treatment a few microfilariae persist. Similarly the pleural cavities still contain many dead and apparently healthy microfilariae in the vicinity of the adult worms. It appears that these form a reservoir from which the supply in the blood is being constantly replenished. Hetrazan exerts only a moderate effect on the adult worms so that prolonged intensive treatment is necessary and even then many of the worms escape.

Microfilariae can be maintained alive for several days at 37°C. in serum plus Ringer's solution and glucose but when Hetrazan is added it has no apparent direct effect upon them—neither has serum from Hetrazan-treated rats any effect. Further studies made from the examination of the distribution of microfilariae in different organs revealed that in Hetrazan-treated rats the microfilariae congregated in the liver probably in the sinusoids. When the rat were killed six hours after treatment, many microfilariae were surrounded by phagocytes which were attacking them. The lungs form a special case in cotton-rat filariasis as they constitute the chief port of entry for the microfilaria from the extravascular spaces (pleural cavities) into the circulation and their microfilarial content is correspondingly high.

It is concluded that Hetrazan acts by modifying the microfilariae in some way so that they are seized by the phagocytes of the reticulo-endothelium and presumably destroyed. In this respect its action would resemble that of opsonins. Microfilariae which are removed from contact with phagocytes are not speedily affected by hetrazan.

The chemical or physical reactions underlying this "opsonizing" effect of hetrazan are unknown, but they must be rapid in their action.

P. Manson-Ball

NDBERG, K. Seconde enquête épidémiologique sur la draconculose dans l'Inde [Second Epidemiological Investigation of Dracontiasis in India] *Bull Soc Path Exot* 1948, v 41, Nos 3/4, 282-93

A study of dracontiasis was undertaken in Vangarvadi, a village in the State of Hyderabad. It is situated on the banks of a river which is dry for most of the year. The rains, which are not abundant, form ponds which dry rapidly. As a general rule, water is found near the village only from June to September—August to October. Most of the inhabitants obtain their water from a single well in the bed of this river. The villagers descend steps to reach the water in this well.

The Hindu inhabitants, Mahratta cultivators, almost all belong to one caste. There are certain Mussulman families. There are also untouchables (Mangs) who are forbidden to use the well and obtain their water from ponds while it is available, but during the driest seasons they have to use water from the well, and the Mahrattas pour into their storage tanks without touching them. Thus, the whole village drinks water from this well at some time during the year. Boiling of water is almost unknown and the inhabitants seldom filter the water effectively, so that they are all subject to infection from this well.

The total population of the village was 700 to 800, but without official support the author was only able to study 310 persons. Of these 82, or 26.4 per cent, had been affected with dracontiasis.

The data are given in tabular form, some points from the digestion of these tables are given below—

Below the age of 5 years, one child was affected. Nine persons had their first attack at the age of 5, and 7 at the age of 6 years. At the succeeding ages 7 to 20, the following were the incidences of first attacks—1, 1, 4, 3, 0, 2, 0, 3, 5, 0, 1, 2, 3 and 7. At ages from 21 to 36, there were 18 first attacks and one at each of the ages, 49, 63 and 68. Four persons had their first attack "during infancy" and 7 could not state the age of their first attack.

The number of worms from which each individual suffered were as follows—one worm—19 persons, two—18, three—6, four—5, five—2, six, seven and eight—1 each, ten—2, twelve, thirteen, sixteen, eighteen, twenty-five and thirty—1 each, thirty-five—3, forty and sixty—2 each, sixty-five, eighty, one hundred, one hundred and sixty and two hundred—1 each. In 9 cases there were "many worms" but the number was not known.

Thirty-two persons had suffered from dracontiasis for one year, thirteen for two years, four, four and five for 3, 4 and 5 years, respectively, and eighteen for more than 5 years, the longest period being 50 years.

The maximum number of worms in one year were one in 32 cases, two in 19 cases, three in 10 cases, four in 4 cases, five in 4 cases, and seven or more with a maximum of 50 in the remaining 6 cases, in seven this number was not determined. The localization of the worms was as follows—Feet—23, ankles—71, legs—81, knees—43, thigh—24, buttock—4, upper limb—26, of which 18 were on the left side, trunk—15, genitalia—10, and head and neck—4.

The author asks why it is that when all were subjected to infection from this well more or less continuously, only a proportion showed infection at any time of their lives, why some have heavy infections and some light, and finally why some are infected early in life others late? Unfortunately, those who had escaped entirely would not allow any examination. [The author gives no indication of the caste distribution of the patients.]

L. E. Napier

DEFICIENCY DISEASES

TROWELL, H. C. Medical Examination of 500 African Railway Workers.
East Afric n Med J 1948 June & Aug v 25 Nos. 6 & 8 762-764
 711-21

1. This paper presents in terms intelligible to the layman the background and general conclusion of the medical survey. Climate, conditions of work, housing, psychological stresses and prevailing diseases are briefly described. Details of the diet are to be reported separately. Briefly, the rations issued consisted only of maize-meal and meat and supplements which workers had to be bought out of wages. Trowell criticizes this system, since abundant and says—"everything suggests that Africans can arrange their own diet much better than has been arranged for them by Europeans in basing it on any system of rations."

By supplementing the ration the workers were achieving an adequate and nearly adequate diet. This however is not the whole story. Clinical and pathological studies have shown that the syndrome called by Trowell "malignant malnutrition" is very common in East Africa. It is characteristic of this disease that its effects are widespread throughout the body and they are permanent. Thus, in considering the causes of inefficiency and ill-health in Africans it is necessary to take account of the past as well as the present of the previous dietary background and of old injuries resulting therefrom. "Almost the whole of the medical report must therefore turn on the evidence of malignant malnutrition."

The African child is handicapped in his development before and after birth. It is only during 6 months of breast feeding that for one long period in his life he achieves parity. Thereafter he passes through a period of malnutrition which damages many internal organs to an extent he cannot assess by present techniques. Not only the body but the development of mind as well may be injured. The whole weight of the clinical and pathological evidence supports the contention that many if not the majority of Africans have suffered and may still suffer from a disease which has left not only scarred and crippled internal organs but scarred and crippled mental attitudes and reactions. Hence the apathy and lack of initiative so often noted in African adults. The vicious circle is established of low work, low wages, malnutrition, poor living conditions.

II. In the second paper are given the results of the clinical examination for signs of malnutrition. For the general reader the interest will probably be not so much in the findings themselves as in the discussion of diagnostic criteria, and of the difficulties encountered in nutritional surveys. In particular there is a detailed description of cracked skin or mosaic skin and of the points which differentiate it from crazy-pavement dermatosis.

The results are classified under two headings—recognized and doubtful signs of malnutrition. There was no clear-cut evidence of calorie or protein deficiency. More than a third of the subjects showed alteration in the conjunctiva—thickening, pigmentation, vascularization and dryness. In three per cent., foam-like plaques were present as well—these cases were classified as xerophthalmia. 33 per cent. of the employees had follicular keratosis of varying degree and in 24 per cent. there was xerosis of the skin. These skin and conjunctival changes are listed under the heading of vitamin deficiencies. There was no evidence of vitamin B deficiency. Signs of avitaminosis were uncommon, cheilosis being present in two per cent. and corneal vascularization in three per cent. In a few subjects there were mild changes in the tongue attributed to nicotinic acid deficiency, such as swelling, localized bare areas, redness and hypertrophy of papillae. Classical pellagra was not

seen, and there were no cases of scurvy. Parodontal disease and non-scorbutic gingivitis were, however, common. There was no evidence of rickets, no proven case of rickets has in fact ever been found in an African in East Africa. The iron intake was adequate, since the diet consisted largely of maize, and there was no clinical evidence of anaemia. Although the calcium content of the ration was low, there were no clinically apparent effects of calcium deficiency. Active dental caries was present in only six per cent.

The remaining sections are devoted to signs of uncertain origin, which were found as follows —

Hair—loss of texture	12 per cent
Hair—loss of texture and some loss of colour	4 "
Crackled skin (all grades)	42 "
Enlargement of the liver	2 "
Gynaecomastia	5 "
Parotid enlargement, moderate or marked	18 "

A technique is described for detecting and estimating the degree of parotid swelling.

[It is to be hoped that the introductory paper will in fact be read outside purely medical circles for the problems discussed in it with clarity and force are important not only to doctors. The emphasis on the psychological results of malnutrition is welcome. We are no longer concerned only with frank deficiency disease, but more and more with suboptimal health, in which the physical signs may in themselves be insignificant. They serve, however, as clues, pointing to disabilities that we cannot yet assess. During the war some work was done on the relation of nutrition to performance and behaviour (FRANKLIN, SCHIELE, BROZEK, & KEYS, (1948) *J Clin Psychol* v 4, 28) but only the surface of the field has been scratched.

Trowell implies that malnutrition is the point at which to attack the vicious circle of low work, low wages, low food. The challenge is not lightly made, for he goes on to say of malignant malnutrition that the cause is unknown, the prevention uncertain, the cure often impossible. The disease is not to be explained by current nutritional concepts, with many of which it is in sharp conflict.

The second paper illustrates the incompleteness of our knowledge in a different way. A severe critic might argue that almost every one of the positive findings recorded in the survey should be listed under the heading "of uncertain origin". For instance, not all workers would agree that the conjunctival changes described are caused by vitamin A deficiency. KRUSE [see *Bulletin of Hygiene*, 1942, v 17, 115] believes that they are, but PLATT prefers to use the non-committal term "excess tissue" [*ibid*, 1945, v 20, 412]. The literature suggests that the clinical appearance is not identical with xerophthalmia in the Far East, and there are differences in natural history. "Excess tissue" never goes on to keratomalacia, it is less common in the young, and more common with pterygium, which in Europe is regarded as a senile change. Whatever the origin of "excess tissue", it seems to be an example of the generalization, that the effects of malnutrition mimic those of senility. The question now arises, is this true also in the psychological sphere?]

J C Waterlow

ALTMANN, A & MURRAY, J F. The Anaemia of Malignant Malnutrition (Infantile Pellagra, Kwashiorkor). Protein Deficiency as a possible Aetiological Factor. *South African J Med Sci* 1948, June, v 13, No 3, 91-113, 8 figs (4 on 1 pl) [80 refs]

Haematological investigations were carried out between October 1946 and January 1948, in the Johannesburg non-European Hospital, upon 34 children

suffering from gross nutritional disorders. Thirty-one of the cases were typical of the "malignant malnutrition" syndrome with oedema, rash, mucous membrane and hair changes; the remainder were cases of uncomplicated nutritional oedema.

Anaemia was found in all, but was of only moderate degree even in those who were very severely ill. It was mostly normocytic in type (23 out of 34 cases); 4 of the children had a microcytic blood picture while 7 were macrocytic; a fourth became macrocytic while under observation.

Only 8 of the 17 bone marrow specimens examined showed abnormal cells suggestive of the megaloblastic anaemia associated with lack of liver principle or folic acid, and of these only 2 occurred in cases with macrocytic anaemia. The abnormal marrow cell were of intermediate type rather than typical megaloblasts and even when present they were never predominant.

Treatment consisted almost entirely of dietary improvement. Skim lactic acid milk was used. This induced a reticulocyte response in 9 cases; clinical response was rapid and satisfactory.

During the early part of the recovery phase there was frequently a drop in haemoglobin level and in red cell count, which is interpreted as being due to an early rise in plasma volume outstripping the rate of regeneration of red cells and haemoglobin.

On the basis of their findings the authors conclude that the normocytic anaemia in these cases is due to deficiency either of total protein or of some specific amino-acid, possibly tryptophane; and that the anaemia, together with lowered plasma volume represents a disturbance of blood regeneration due to lack of essential blood-forming materials. The occurrence of hypochromic or megaloblastic anaemias, indicative of deficiency of iron and liver principle respectively is due to the presence of complicating factors or associated deficiencies in much the same way as skin lesions and lesions of mucocutaneous functions can be regarded as being due to associated vitamin deficiencies and not as a fundamental part of the protein imbalance picture. [See WATERLOO, this Bulletin 1945 v. 45 774. Dea, J. Smith.]

KAUFMANN, C. F. & PUGLIESE, J. M. Estudios acerca de la distrofia en los niños de Lima (Peru) [Studies on Infantile Malnutrition in Lima, Peru.] *Rev. Hospital del Niño* Lima, 1947 Sept. Dec. v. 9 Nos. 52-53 17-33 11 figs. on 6 pls.

Ninety per cent. of the infants and children less than five years old, admitted for various causes to the children's hospital in Lima, were below normal weight. The weight-deficit became more frequent and more severe with increasing age. A quarter of the babies were 40 per cent. or more below weight, and a quarter of the children between two and five showed signs of multiple vitamin deficiency. This high incidence of malnutrition results from social factors, poverty, illiteracy, overcrowding, or deprivation by one or other parent.

In 10 malnourished babies a special investigation was made of the pathological physiology of the liver. Unfortunately no clinical data are given in this paper. There was a normocytic anaemia of moderate severity with little or no leucocytosis. The serum protein concentration ranged from 5.1 to 6.6 gm. per cent. with an albumin globulin ratio of 1:1.1-1.9. There was a slight increase in serum bilirubin and a reduction in serum cholesterol. Three liver function tests were made; the Manger cephalin-cholesterol test was positive in all ten cases, bromsulphthalein retention was found in one case only. In most of the babies there was impairment of glucose tolerance with raised blood-sugar levels persisting after two hours [see HODGINS & THOMAS, this Bulletin 1945 v. 45 728].

Biopsies of the liver were made in four cases. In all there was cellular infiltration of the portal spaces, with varying degrees of fatty change and vacuolation of the liver cells. There was some thickening of the walls of the portal vessels. The bile-ducts were normal. In one case, connective tissue fibres from the portal tracts were infiltrating the parenchyma, cutting up the lobules.

J C Waterloo

FERNANDO, P. B., MEDONZA, O. R. & RAJASURIYA, P. K. Cirrhosis of the Liver in Ceylon and its relation to Diet. A Review of 102 Cases. *Lancet* 1948, Aug 7, 205-11, 9 figs [17 refs]

The cases described are divided into two groups on the basis of clinical history and the appearance of the liver at necropsy or biopsy. Fifteen cases were classified as toxic cirrhosis. In 12 of these there was a history of an illness, characterized by jaundice and biliruria, preceding the onset of cirrhosis. On admission to hospital, ascites was present in all 15, oedema in 12, and splenomegaly in 3. van den Bergh and Takata-Ara tests were positive, hippuric acid excretion was reduced, in several cases to less than 25 per cent of normal. The plasma albumin concentration was low, and the albumin globulin ratio was reversed. Four patients were discharged apparently cured. In six others the diagnosis of toxic cirrhosis was confirmed by biopsy or post-mortem examination. The liver was coarsely nodular, microscopically there were collections of hyperplastic liver cells, without normal lobular structure, and separated by areas of scar tissue containing numerous bile-ducts.

The remaining 87 cases were classified as Laennec's cirrhosis and further divided into 3 sub groups, according to the stage of development of the disease. In the earliest stage, the only constant clinical finding was great enlargement of the liver, the edge being 3 finger-breadths or more below the costal margin. In most cases of this sub-group the diagnosis was confirmed by biopsy. As the disease developed, ascites became more common and oedema, splenomegaly, and haematemesis were also found. In the final stage the liver was contracted and no longer palpable. There was no clinical jaundice in this group, and bile-pigment was only occasionally found in the urine. In half the cases, however, there was a positive van den Bergh reaction, and in nearly half an increased urobilinuria. Even in the early stages the Takata-Ara test was positive, and hippuric acid excretion reduced. The plasma proteins showed the changes characteristic of liver dysfunction—a reduction in albumin and an increase in globulin. Anaemia was present sometimes macrocytic and spherocytosis was also found in a few cases. At autopsy in patients of this group the liver was finely nodular. Microscopically there was a fine fibrosis affecting particularly the portal regions and breaking the lobules up into small groups of cells. In the early stages the fibrosis was accompanied by extensive fatty infiltration.

Much attention has been devoted in recent years to malnutrition as a possible cause of cirrhosis of the liver in the tropics. For this reason the dietary history was investigated in as many cases as possible. In the first main group the diet was considered to be adequate in 8 cases, and in these the cirrhosis was regarded as a sequel to infective hepatitis. In 6 others the diet was deficient, particularly in protein and the authors comment that "it looked as if the experiments of HEMS WORTH and GLASS [see *Bulletin of Hygiene* 1944 v. 19, 584, had been reproduced unwittingly".

In the group of Laennec's cirrhosis a detailed dietary history was available in 43 cases. The diets were classified, from good to bad, as A, B, C, D. The distribution of the diets among the patients, and in 400 non-cirrhotic controls, is shown in the accompanying table.

Diet	In patients with Cirrhosis per cent	In controls, per cent
A	37	61.4
B	0	22
C	23	9.25
D	30	8.25
No. cases	43	401

About four times as many cirrhotics as control fall into group C and D. It is noteworthy also that all the cases of early cirrhosis with fatty infiltration of the liver from whom a history was available fell into category D.

These results are discussed in the light of recent experimental work on dietary liver damage and it is concluded that in these cases cirrhosis of the Laennec type was preceded by fatty infiltration caused by a diet deficient in animal protein and lipotropic factors. In some cases alcoholism may also play a part since it was commoner among the cirrhotics than in the control series.

It is impossible in an abstract to do justice to this valuable paper which contains many details that have not been mentioned here and is illustrated by excellent photomicrographs. There is a close parallelism between these clinical findings and the two types of dietary liver injury produced experimentally by HUSWORTH and GLYNN [loc. cit.]. On closer examination however the rôle of malnutrition as a cause of toxic cirrhosis in the cases described above appears open to question. For if out of the 15 patients there were 8 who were well-nourished, and were diagnosed as having infective hepatitis, why should not the 8 ill-nourished also have had infective hepatitis? The evidence, in fact, rests on two points. 8 cases out of 15 with a history of bad diet is a higher proportion than in the control series. Secondly in several of the cases the diet had been rather severely restricted for a relatively short period before the onset of jaundice. Neither of these points is conclusive in such a short series.

The evidence on the other hand, for a relation between malnutrition and diffuse fibrosis is impressive, and is the first of its kind. Hitherto nothing more positive has been established than a general correlation between the incidence of cirrhosis and of malnutrition.

J. C. B. Acland

1. NITULESCU, J. *Etat actuel des recherches sur la pellagre en Roumanie* [Present Position of Pellagra Studies in Rumania.] *Bull Acad Med Roumanie* 1947 v. 20 No. 12, 25-30. 19 ref. 1

2. — *Esquisse d'un programme d'étude et de lutte contre la pellagre en Roumanie*. [Outline of a Campaign against Pellagra in Rumania.] *Id.* 1947, 372-9

1. Pellagra is still one of the most serious endemic diseases in Rumania. In 1943 for instance 10,307 cases were recorded as attending hospital and clinics and it is thought that in 1938 the actual incidence was probably in the region of 110,000 cases. There were in that year over 3,000 deaths.

In this paper pellagra is taken to mean multiple deficiency in which symmetrical photosensitive dermatitis predominated. The symptomatology followed mainly the classical triad, but showed great variability in severity of

different symptom groups. No pathognomonic biochemical changes were discovered, nicotinic acid excretion was diminished in some cases, but this was inconstant.

The highest incidence of the disease occurs in Moldavia where the diet of country folk contains an excessive proportion of maize and is deficient in protein [see BORROW *et al* this *Bulletin*, 1948, v 45, 729].

Nicotinic acid has been found of the greatest use in treating the classically pellagrous part of the syndrome, but has to be accompanied by an all-round improvement of diet to clear up the whole deficiency state.

11 In his second paper, the author appeals for a concerted attack on the pellagra problem in Rumania. He emphasizes the necessity for field investigations to determine the full dietary pattern of the inhabitants of the areas where pellagra is endemic and the natural history of the disease.

While clinical and laboratory studies are of the greatest importance, this social scourge can ultimately be eliminated only by reforming the whole pattern of rural economy and diet. Among the measures proposed for this purpose are demonstration farms, co-operatives, domestic science schools, canteens and model bakeries.

Dean A Smith

RAMALINGASWAMI, V, MENON, P S & VENKATACHALAM, P S. Infantile Pellagra. Report on Five Cases. *Indian Physician* 1948, Sept, v 7, No 9, 229-37, 7 figs on 2 pls [27 refs]

These five babies presented all the typical features of infantile pellagra or kwashiorkor. They came from families of the labouring class, whose diet is known to be deficient, and among whom malnutrition is prevalent. The age at admission ranged from 6 months to 3 years. The main clinical features were dryness of the hair, angular stomatitis and blepharospasm, oedema, enlargement of the liver, and lesions of the skin. These are illustrated in several photographs, and appear to fulfil the criteria laid down by TROWELL [this *Bulletin* 1941, v 38, 722] for "crazy-pavement" dermatosis in Africa. The lesions consisted of pale desquamated areas surrounded by a zone of hyperpigmentation, and were found in the popliteal and antecubital fossae, in the groins, on the vulva, and on the buttocks. There was a history of diarrhoea in all the cases, examination of the stools showed nothing abnormal except for fat globules, and in one case blood and mucus.

Treatment was unsuccessful, in spite of a high protein diet, supplemented with riboflavin, thiamin, and nicotinamide by injection, all the babies died. Permission was not given for post-mortem examination.

[Three points are of interest in this paper. In the first place the report of HARE (*ibid*, 1947 v 44, 738), is confirmed, that kwashiorkor does in fact occur in India. The question, however, still remains, whether it is as common as in Africa, and if not, why not? Secondly, although it is difficult to judge from so small a series, the exceptionally high mortality supports the belief of GILLMAN and GILLMAN (*ibid*, 118) and of MAGALHÃES CARVALHO (*ibid*, 1948, v 45, 635) that pure vitamins do no good, and may in fact do harm. Thirdly, an unusual feature is that most of the babies were still on the breast at the time when symptoms first appeared—more commonly the disease does not begin until after weaning.]

J C Waterlow

VIRIRA, J R. Comentário sobre o estudo da pelagra [Comment on the Study of Pellagra]. *Anais Paulist de Med e Cirurg* 1946, June, v 51, No 6 399-410.

This is a general resume of the subject with special note on the disease in Recife and a few other towns in São Paulo. The whole is a fair sketch of the

main features of pellagra its history the different theories as to causation its symptoms and pathology, and in general terms the results of treatment by dieting and the giving of nicotinic acid and nicotinamide 1 gm. orally and 3 gm. intramuscularly as a daily dose

In Recife itself during the period 1940-41 there are record of 23 women and 24 men patients. In 34 other towns a total of 94 women and 34 men, altogether 115. The age of one man was not known. Of the others in succeeding decades from the second to the ninth there were 2, 21, 29, 30, 17, 11, 5 and 2, practically half the total in the 30-60-year group. Information obtained by following up the cases (for how long?) showed that of the 68 males 41 had died, 18 were cured, 2 had improved, while 7 were unchanged. Of the 49 females 36 had died and 13 were cured.

II Harold Scott

MAINTNER P. The Pellagra-Electrocardiogram and its Significance. *Acta Med Scandinavica* 1948, Sept. 15 v. 131 No. 3 269-87 3 figs. [31 refs.]

Non-specific changes in the electrocardiogram have been described in pellagra by LACHNILEWITZ and BRAUX (*Brit Heart J* 1945 v. 7 77). The most common are depression of the S-T interval and abnormality of the T wave (T flat, isoelectric, or negative). In the present paper studies are reported on 45 pellagrins. Abnormal or borderline ECG findings were observed in 34 cases; they are thus a common concomitant of pellagra, as frequent as any other single lesion such as dermatitis, diarrhoea or glossitis. The proof that these ECG changes are caused by pellagra rests on the exclusion of other causes and on the response to treatment with nicotinic acid. There was however no relation between the presence or intensity of cardiographic changes and the duration, intensity, or predominant localization of the pellagrous lesions.

In general, a parallelism was found between the course of the disease and of the changes in ECG although there were many exceptions: sometimes the cardiogram became worse during clinical cure and sometimes it improved even when the pellagra ended fatally. In more than half the patients the ECG became normal or improved on treatment with nicotinic acid. In some cases there was further improvement when thiamin or yeast was given as well.

In the discussion it is suggested that failure to respond to treatment may result from irreversible damage to the heart-muscle. Several factors may account for the variability of the ECG changes and the lack of any close correlation with the other manifestations of pellagra. These are variation in the rate of nicotinic acid depletion, and interactions with other vitamin deficiencies, some of which may enhance and others inhibit the process of myocardial damage.

J. C. Waterlow

DOXIATES T. & TILIAKOS M. Die Schwarze Zungenzunge (Black Tongue): a) Mangelerscheinung bei Menschen. Black Tongue as a Deficiency Symptom in Man. *Schweiz med Woch* 1944 Oct 23 78 No 4 1011-7 3 figs. 1 ref.

Black tongue of dogs—the analogue of human pellagra—was not seen in human pellagrins but the so-called hairy tongue occur with or without the usual signs of pellagra. The author record four cases. In this condition three recovered on being given nicotinic acid, the fourth, who suffered from diplegia and pernicious anaemia as well as hairy tongue, did not. The author argues that in favour of there being some connexion between the hairy tongue and pellagra in man and the black tongue of dogs are the fact that in the cases here recorded good result followed the administration of

nicotinamide plus vitamin B complex, that in all there was a basal B-avitaminosis, and that the condition developed in the spring. On the other hand, it is acknowledged that up to the present black tongue has not been observed in pellagra nor in times of epidemics, nor has it been produced in experimental pellagra in man, and that it was not recorded in the severe hunger epidemic of 1941-42 in Greece. He concludes with the remark that distinction must be made between acute and chronic deficiency and that it is in the latter that "black tongue" occurs.

H Harold Scott

HAEMATOLOGY

SCHWEIGERT, B S with the technical assistance of Frances PANZER & Patricia SPARKS. Folic Acid Metabolism Studies. III Intravenous Administration of Pteroylglutamic Acid and Pteroyltriglutamic Acid. *J Lab & Clin Med* 1948, Oct v 33, No 10, 1271-5, 2 figs [14 refs]

BERK, L, BAUER, J L & CASTLE, W B. Folic Acid. A Report of 12 Patients treated with Synthetic Pteroylglutamic Acid with comments on the Pertinent Literature. *South African Med J* 1948, Oct 9, v 22, No 19, 604-11, 7 figs [21 refs]

Twelve cases of pernicious anaemia have been treated with synthetic pteroylglutamic acid in Boston, Mass. The plan of dosage was 10 mgm intramuscularly daily during the initial stages of the response, during which time the diet was devoid of haematopoietically active substances. This was followed by maintenance with 75 mgm intramuscularly once a week. The reticulocyte responses and initial rises in red cell count and haemoglobin were entirely comparable with those seen with purified liver extract therapy. Four patients were studied during ten days to two months of therapy. In three, treatment was continued and complete remission observed. Four showed failure of the blood values to return to normal, this was attributable in two cases to inadequate amount of therapy, and in another to concomitant iron deficiency. Two patients on constant folic acid dosage showed a decline below normal in their blood values after a normal status had been maintained for four and five months respectively. In both, normal blood values were restored by intramuscular injections of purified liver extract.

Neurological manifestations developed for the first time or progressed in one of the five treated with 75 mgm of folic acid intramuscularly weekly from eight to 17 months, but also in two others who had received 50 mgm of folic acid daily by mouth for 6-11 months respectively.

The haematological responses and prompt general clinical improvement following the use of folic acid in pernicious anaemia and related macrocytic anaemias closely resemble the results of liver extract therapy. In some patients, however, development of glossitis and failure to maintain a normal blood picture have been observed under folic acid therapy. In view of the considerable incidence of neurological manifestations in cases of pernicious anaemia maintained on it, folic acid should probably not be used therapeutically in this condition until the nature of this undesirable effect is better known.

P Manson-Bahr

MEYER, L M. Neurologic Sequelae in Macrocytic Anemia of Gastrointestinal Origin following Folic Acid Therapy. *Amer J Clin Path* 1948, Oct v 18, No 10, 811-14, 1 fig [12 refs]

"A patient with macrocytic hyperchromic anemia, attributable to faulty intestinal absorption, was successfully treated with liver extract to which he

became sensitive. Treatment with folic acid for thirteen months was followed by the development of peripheral neuritis and combined system disease. Successful desensitization to liver extract and treatment with this drug resulted in complete remission of the neurologic disease and return to health."

PATEL, J. C. Crystalline Anti-Perniciou-Anaemia Factor in Treatment of Two Cases of Tropical Macrocytic Anaemia. *Brit Med J* 1948, Nov '7 834-5. [11 refs.]

"Two cases of tropical macrocytic anaemia showed good response to treatment with 60 µg of Lester Smith's crystalline anti-perniciou-anaemia factor."

DERMATOLOGY AND FUNGUS DISEASES

LEON, L. A. El carate o mal del Pinto en los niños. [Mal del Pinto in Children.] Publicaciones del Ministerio de Previsión Social Quito Ecuador 1944 27 pp. 8 figs. [13 refs.]

This brochure was presented at a Medical Congress held in Quito Ecuador in 1942, was published two years later but was not received here until October 1948. The information it contains was well up to date at the time but contains little that is not common knowledge now. Pinto in Ecuador at least, is far more common in children than is generally believed. In the State of Guerrero of 1,535 patients 633 (47 per cent.) were under 10 years of age. HENRIJON recorded 259 of 683 (37 per cent.) from various Mexican States and the present author found 35 out of 100 cases in Los Chillos Valley to be in children under 10 years. It is estimated that more than half (53 per cent.) of the patients are below 15 years of age. The causes for this preponderance among the young are stated to be first, that the children are out in the field and are attacked by flies and mosquitoes; second, that their skin is delicate and largely unprotected especially the arms and legs; third that they suffer from small lesions scratches erosions and the like; and, fourth that they are the chief victims of other dermatoses scabies impetigo etc.

The author gives the geographical distribution of the disease in Inter tropical America. The chief endemic zones are in Mexico Colombia Venezuela Ecuador Brazil Peru and Porto Rico but cases are also met with in El Salvador Guatemala Honduras Panama Bolivia and Argentina. In Ecuador itself there are four pinto-genic zones: (1) The valley of Los Chillos in the province of Pichincha; (2) the valley of Catamayo, Loja province; (3) Santa Rosa de Machala, El Oro province; and (4) several local in the province of Napo-Pastaza. In six other provinces namely Santiago-Zamora Esmeraldas Manabí, Los Ríos Tungurahua and Azuay, cases have been seen.

The remainder of the article is concerned with the aetiology, symptomatology, course, pathological anatomy, diagnosis, prognosis, treatment both curative and prophylactic, and does not call for detailed notice here. H. Harold Scott

SALVIX, S. B. & HOTTEL, G. V. Serologic Studies on Antigens from *Histoplasma capsulatum* Darling. *J Immunology* 1948 Sept. v (6) No. 1 57-64 3 figs. [23 refs.]

To determine the best antigenic preparation for the detection of antibodies to *Histoplasma capsulatum* in serum, by the complement fixation and precipitation tests the authors investigated seven different *H. capsulatum* antigen

preparations, using the sera of experimentally infected rabbits. The antigens used were (1) A suspension of intact, formalized yeast-form cells, (2) the filtrate of liquid obtained by grinding up a mass of washed, yeast-form cells, (3) the solid residue left after filtration for 2, (4) the filtrate of a broth culture in the yeast form, (5) the filtrate from grinding up a mycelial mat in saline, (6) the solid residue left from filtration for 5, (7) the filtrate of a broth culture in the mycelial form. It will be noticed that 2, 4, 5 and 7 are soluble antigens and 1, 3 and 6 are particulate. Numbers 1, 2, 3 and 4 are derived from the yeast form of the fungus and 5, 6 and 7 from the mycelial form. All seven antigens were immunologically similar, but the particulate preparations seemed to contain at least one antigenic factor not present in the filtrates, a difference demonstrable by antibody absorption.

Precipitation tests with the four soluble antigens gave positive results with rabbit sera drawn up to about six weeks after infection, and reactions at the highest titres occurred with sera drawn when the animals were clinically ill. The strongest reactions were given with the mycelial broth culture filtrate (No 7). These tests gave negative results with sera drawn 8 to 10 weeks after infection. On the other hand, complement-fixation tests with the particulate yeast antigen (No 1) gave the strongest reactions with sera drawn five weeks after infection, but the reaction persisted at a lower titre for at least six months, which demonstrates the value of this test in the diagnosis of chronic infection.

J T Duncan

NEGRONI P, DAGLIO, C A N & BRIZ DE NEGRONI, C. Estudios sobre el "Coccidioides immitis" Rixford y Gilchrist V [Studies on *Coccidioides immitis*] *Prensa Méd Argentina* 1948, Aug 20, v 35, No 34, 1652

After a case of generalized coccidioidomycosis had been reported in the Río Colorado area (Río Negro Territory, Argentina) a survey was made to ascertain the probable incidence of the disease in the country.

Intradermal tests with 1/100 standard coccidioidin were made on 2,065 primary school children, boys and girls, between the ages of 6 and 15, in 7 stated areas. Complete results were available in 1,834 children and are shown as percentage findings of positive and doubtful reactions. [It is stated that results were read after 24 hours, but what was the criterion of a "doubtful" reaction is not stated.]

The positive results varied from 1 to 10.26 per cent and the "doubtful" from 1.66 to 5.63 per cent. The high positive figure of 10.26 per cent was found in the Río Colorado area. The highest "doubtful" result (5.63) was in Neuquén. It is noted that most of the positive reactions in the Río Colorado area were ++ or +++ and that a symptomatic case was seen. No correlation was noted between positive findings and sex, but there was a peak of incidence between the ages of 10 and 11.

It is added that one member of the Commission developed a positive coccidioidin reaction and mild bronchitis 15 days after his arrival in Río Negro, which is taken to confirm the "endemic character of the zone investigated." This zone corresponded to the dry regions and the authors recommend soil irrigation as one means of limiting the dangers of endemic coccidioidomycosis.

H J O'D Burke-Gaffney

GUNCHE, F F, RADICE, J C & FEOLI, L S J. Blastomycosis primitiva de boca (Paracoccidioides brasiliensis) [Buccal Blastomycosis (*Paracoccidioides brasiliensis*)] *Semana Méd* 1948, Oct 21, v 55, No 43, 866-9, 7 figs

Report of a case

QUIROGA M I, NEGROSI P & CORPORA L A. Resultado de la terapia sulfamidica asociada a la vacunoterapia especifica en cuatro nuevas observaciones de blastomycosis sudamericana. [Results of Sulphonamide Therapy associated with Specific Vaccine-therapy in Four New Observations of South American Blastomycosis.] *Rev. Argentina Dermatofisiologia* 1947 July-Dec. v 31 Nos. 3 & 568-72, 4 figs. (23 refs.)

The South American type of Blastomycosis (paracoccidioidal granuloma) was formerly believed to be incurable but encouraging results from the treatment of the disease with the sulphonamides have been reported recently.

The present paper records the clinical cure of four cases by means of the combined treatment with intravenous injections of "solithiazamida" a preparation of sulphathiazole 1 gm. daily with weekly intramuscular sulphathiazole 3 gm. daily and a vaccine of *Paracoccidioides brasiliensis* given subcutaneously in increasing doses. Supplementary treatment took the form of intramuscular injections of liver extract and vitamins B and C and local medication of the lesions with sulphonamide pomade alternation with sulphathiazole powder. The first patient an Argentinian journalist aged 53 who had mucocutaneous lesions in the mouth and nose and other ulcerating lesions on the cheek and heel with associated lymphadenopathy as well as evidences of involvement of the lungs, was clinically cured in three months during which time he received 71 injections of "solithiazamida" 231 gm. of sulphathiazole 20 injections of *Paracoccidioides* vaccine and some blood transfusions. The other three patients all males, aged 45, 57 and 47 years respectively received the same kind of treatment and showed similar rapid recoveries. It is noteworthy that one of the three was a syphilitic who had been under treatment for this disease with arsenic and bismuth and had received 3 million units of penicillin with little apparent effect on the blastomycotic lesions.

Brief clinical descriptions of all the cases are given and the authors mention the use of the coccidioidin skin sensitivity test in one case with a positive result presumably paracoccidioidin was meant.

An interesting observation was the apparently long incubation periods of 22 years and 28 years respectively in two of the cases as judged by the interval between the presumed time of exposure to infection and the discovery of mucocutaneous lesions.

J. T. Dwyer

HEAT STROKE AND ALLIED CONDITIONS

LADELL, W. S. S. The Measurement of Chloride Losses in the Sweat. *J. Physiology* 1948 Sept. 30 v 107 No. 4 495-71 7 figs. (15 refs.)

This paper reports the results of direct measurement of salt losses during exercise in hot environments and compares these with the losses calculated from the chloride samples obtained over the same period from the whole arm. Sixteen experiments were done on seven subjects.

The classical studies of salt loss during sweating were based on the recovery of all the sweat produced. That method though accurate is cumbersome and not generally applicable. It has been reported earlier by other workers that the chloride content of the sweat varies according to the part of the body from which it comes. The present results show that in humid heat if the whole arm is enclosed the sweat collected from the arm has the same chloride content as the mixture of sweats from all parts of the body. It is concluded that this finding does not indicate that the chloride concentration in sweat is the same

for all parts of the body, but is probably a chance effect due to the difference in concentration of sweat from different parts of the arm and hand, and to the modifying effect of total enclosure

Although the experiments were only carried out in hot humid climates, it is thought that sweat samples from enclosed arms are equally good as an indication of the whole body sweat in hot dry environments *Thomas Bedford*

MISCELLANEOUS DISEASES

RAPER, A B **Pigmentation of the Tongue** *East African Med J* 1948, June, v 25, No 6, 245-50 [10 refs]

Pigmentation of the tongue is very common in the African. It takes several forms. Most commonly there are brown or inky-blue spots, formed by deposits of pigment in the fungiform papillae. Sometimes these are accompanied by diffusely pigmented plaques, which are brown, slaty-grey, or lilac-coloured. Tongues with inky-blue spots, and those with diffuse lilac pigmentation are grouped together as "blue" tongues.

Microscopic examination showed that the pigment in all cases was melanin, no iron-containing pigment was found. The melanin was located in chromophore cells lying in the corium, just beneath the epidermis. Only a few such cells were found in the deeper layers of the dermis. In two cases with diffuse lilac pigmentation there were widely dilated capillaries in the dermis, with branches running up into the cores of the fungiform papillae. This recalled the capillary dilatation found in the tongue in arriboflavinosis, and in experimental black-tongue in dogs. It therefore seemed probable that blueness was caused by capillary dilatation and stasis. To test this, "blue" tongues were compressed with a glass slide, whereupon the blue colour disappeared. Compression of brown or slaty-grey tongues caused no change of colour.

The remainder of the paper is concerned with the significance of pigmentation in the tongue. From an earlier survey of African soldiers it was concluded that pigmentation, and particularly blue pigmentation, was definitely related to malnutrition. This theory has been tested by a further survey of 500 African labourers. The nutritional status was estimated clinically, and the subjects classed in 3 groups—satisfactory, poor, and bad. The overall incidence of pigmented tongues was 42 per cent, and of "blue" tongues 10 per cent. The incidence was the same in all three groups. The original theory of a relation to malnutrition was therefore not confirmed. Only the minority of cases with capillary dilatation can justifiably be attributed to dietary deficiency.

The author believes that pigmentation of the tongue is related not to nutrition but to skin colour. This could not be tested in the survey, because the subjects had rather uniformly dark skins. He discusses, but dismisses, the possibility of a relation to Addison's disease, and points out how little is known about the physiology of pigmentation in general. In the African, pigment may be found not only in the skin and mucosae, but also in deep-seated membranes, such as the arachnoid and the epithelium of the gut. *J C Waterlow*

LOPEZ BUSTOS, C. Posibles interpretaciones bioquímicas del latirismo [The Possible Biochemical Causes of Lathyrism] *Rev Sanidad e Hig Publica* Madrid 1946, Oct, v 20, No 10, 1027-45 [35 refs]

The author has done much work on the chemical analysis of the vetches—the proteins, prolamines, albumins, globulins, glutelins, the nucleic acids, the phosphatids, lecithins, the starch, amylose and amylopectin, and the

colouring matter. Minute details of these analyses and the results are presented in this paper. Those interested must consult the original, for there are too detailed for reference here.

The discussion as to the possible connexion between these findings and the symptoms of lathyrism is largely, if not entirely, hypothetical. It is acknowledged that vegetal phospholipids, though not themselves antineuritic, nevertheless retard the appearance of symptoms of avitaminosis. The author considers the nutritional value of the plant and the pyrimidine bases and lathyrism, quoting many references to the literature. He then proceeds to discuss the soil factor showing that not all vetches are toxic but only (or chiefly) those grown on certain soils particularly those containing selenium and he concludes in these words (translated). "We do not think that lathyrism is due to deficiency of amino-acids although the proteins of the flour are poor in sulphurated amino-acids. The cause of lathyrism may be the toxic action of nucleic acid or the products of their hydrolysis while the colouring matter may have a harmful action. There is also the possibility that the toxic symptoms may be due to selenium in combinations analogous to the sulphur of the sulphurated amino-acids." *H. Harold Scott*

MAKARI J. G. Serial Cephalin Flocculation Curves: their Application in the Study of Tropical Diseases and their relation to a New Resistance Factor. *J. Trop. Med. & Hyg.* 1948 Jan. v 51 No 1 8-20, 5 figs. & 9 graphs. [17 refs.]

This paper discusses in great detail the experimental approach to and application of serial cephalin flocculation curves in health and disease. It deals in particular with the significance claimed for a resistance factor which is discussed at length. To follow the author's arguments on the interpretation of his results, the paper should be consulted in the original.

H. J. O'D. Burke-Gaffney

PROTOZOOLOGY GENERAL

AMARI N. & MIKOL A. Présence de toxoplasmes dans des frottes de conjonctive palpébrale humaine. [Toxoplasma in Smears from the Human Palpebral Conjunctiva. *Bull. Soc. Path. Exot.* 1948, v 41 No. 7, 463-4]

A Persian girl of 9 was referred to the eye clinic in Teheran from the school medical service with a provisional diagnosis of trachoma. The only eye lesion found was a very limited granular conjunctivitis on the upper eyelids.

Conjunctival smears showed the presence of crescent or cigar-shaped elements measuring $4 \times 6\mu$ and $2 \times 4\mu$ isolated or in groups. They were almost entirely free but in one or two cases the parasites were intracellular. The globular nucleus was central or sub-central, and stained deep red (stain used not specified). Most forms showed binary fission. The protozoan was homogeneous and stained deep blue with a red staining space around the nucleus.

The authors consider from these features that the parasite must have been a *Toxoplasma* and this diagnosis was confirmed by Dr DUBRY. Clinically no special features of note were found in the child. Some months before however, she had suffered from a sharp fever attack for a fortnight but this had

resolved spontaneously. No laboratory examinations had been made at that time. All physical, neurological and psychological examinations were completely normal.

The authors conclude that toxoplasmosis may be manifested solely in granulations in the palpebral conjunctiva that, in addition to the recognized clinical forms, it may exist in a latent form causing those harbouring the parasite to continue to be carriers and that the presence of toxoplasmosis in Iran helps to confirm the very wide geographical distribution of the disease.

H J O'D Burke-Gaffney

ENTOMOLOGY AND INSECTICIDES GENERAL

MAUZÉ, J. Apparition de *Cochliomyia hominivorax* en Guadeloupe [Appearance of *Cochliomyia hominivorax* in Guadeloupe] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 502-4

The following is a translation of the author's summary —

For the first time a fly *Cochliomyia hominivorax*, hitherto known only in the New World, has appeared in Guadeloupe where it has proved to be a pest to livestock, as it is in America. Therapeutic trials of applying a product containing at least 15 per cent DDT have proved to be very effective.

H J O'D Burke-Gaffney

D'ANDRETTA, C, Jr & D'ANDRETTA, M V. Espécies neotropicais da família Simuliidae Schiner (Diptera Nematocera) II *Lutzsimulium cruzi*, n gen e n sp e nova concepção da nervação das asas dos Simuliídeos [Tropical Species of Simuliidae II New System for the Wing Venation of Simuliidae, with a Description of *Lutzsimulium cruzi*] *Mem Inst Oswaldo Cruz* 1947, Sept, v 45, No 3, 667-77, 35 figs

The English summary appended to the paper is as follows — "A new system for wing venation of Simuliidae is proposed. *Lutzsimulium cruzi* n, gen and n sp is described based on a single female and its pupal skin."

LAIRD, M. Reactions of Mosquitoes to the Aircraft Environment. Reprinted from *Trans Roy Soc New Zealand* 1948, Apr, v 77, Pt 1, 93-114 [26 refs] Issued separately as Royal New Zealand Air Force Entomological Bulletin No 5

In reviewing the literature on the carriage of insects by aircraft the author found that, so far as mosquitoes were concerned, there was little information on the reactions of these insects to the aircraft environment and on their ability to establish themselves in new surroundings after surviving the journey. In view of the fact that many aircraft, on the way to New Zealand, call at places where they are likely to pick up insect vectors of human diseases, these problems were investigated during 1946 both in aircraft and in the laboratory.

In the main enquiry, *Aedes notoscriptus* was used, but a few males of *Culex pipiens pallens* were taken on board an aircraft in Japan for study during and after the return flight to New Zealand. The various techniques are described and the observations are recorded and discussed. The main reactions to the aircraft environment may be summarized as follows —

Both sexes of *A. notoscriptus* were sluggish in their movements when exposed to reduced air pressures corresponding to altitudes of 10,000 to 30,000 feet and

they rarely made voluntary flights. At pressures corresponding to those prevailing at 30 000 to 40 000 feet the mosquitoes did not fly at all and seldom made voluntary movements.

Movements were sluggish at 10°C. to 1°C. and voluntary flights became fewer as the temperature fell. The mosquitoes appeared as if dead at temperatures below 1°C., and when maintained at 3°C. to 5°C. for long periods. On being restored to normal air pressure and room temperature (15.5°C.) *Aedes notoscriptus* rapidly recovered and within ten minutes behaviour appeared to be normal and voluntary flight was made.

Vibration did not significantly shorten the life of the mosquitoes even when so intense as to prevent them resting for periods as long as twenty-four hours at various air pressures and temperatures. Survival in the aircraft was not reduced provided the mosquitoes were able to feed. Without food, males were able to survive under all conditions in the laboratory for an average period of four days; females lived a little longer under the same conditions.

Both *Aedes notoscriptus* and *C. pipiens pallens* flew about inside their cages in the aircraft in agitated fashion when the motors were opened out just before the take-off; behaviour returned to normal within five minutes after the plane became airborne. A similar increase in activity was observed when coming in to land.

The male *C. pipiens pallens* brought from Japan lived for an average of six weeks at New Zealand winter temperatures and it is likely therefore that introduced exotic mosquitoes could become established in the warmer parts of the country.

From this work it is concluded, among other things, that the best time to use insecticidal spraying on board aircraft is immediately before turning into wind for the take-off run. It is suggested that the routine pyrethrum-based aerosol should be sprayed from an automatic system controlled from the cockpit and that there should be a supplemental, residual DDT treatment of all enclosed spaces in the aircraft. As a further safeguard, a ground organization should be maintained for carrying out insecticidal spraying in incoming planes, and until the spraying routine has been completed all aircraft arriving from overseas should be required to halt at a designated place on the taxiway before being allowed to proceed to the tarmac for disembarkation of passengers and unloading.

H. S. LORAN

HADDON, A. J. The Mosquitoes of Swamba County Uganda. VI. Mosquito Breeding in Plant Axils. *Bull Entom Res* 1949, Aug. 39 Pt. 185-192, 2 text figs. & 16 figs. on 8 pls. (16 refs.)

This is an account of a study of plant axils as breeding places for mosquitoes with special reference to *Aedes simpsoni*, a known vector of yellow fever in Swamba Uganda.

Larvae of twelve species of Culicine mosquitoes were found during the survey and it was established that bananas, plantains, colocasia and pine apple were the principal plants concerned. The total number of axils examined was 34,75 of which 14,047 contained water. Mosquito larvae were found in 6,373, so that the potential foci inhabited amounted to 45 per cent. Of the twelve species of Culicines collected, larvae of *Aedes triseriatus* were most prevalent (10,679) larvae of *Culex quinquefasciatus* numbered 10,004 and there were 3,171 larvae of *U. annulipes* var. *annulipes*. Other species occurred in smaller numbers: only 23 larvae of *Aedes aegypti* were obtained. A survey of twelve types of plant showed that three of them, wild banana from moist mountain slopes, *Pandanus* from Semliki Forest and *Colocasia esculenta* from the mountain yielded no larvae of *Aedes simpsoni* though they harboured huge

numbers of other larvae. This is thought to be merely a reflection of the fact that they grow in environments apparently unsuited to this particular mosquito. All other plants yielded *Aedes simpsoni*, the most important being the colocasia *Xanthosoma sagittifolium*.

A special study was made of the water content of the plant axils, one of the many factors influencing the preference of the mosquitoes for one plant over another. The general conclusion was that in Bwamba the optimum capacity seems to lie between 4 and 8 cc.

A monthly survey of one hundred *X. sagittifolium* was made from March 1942, to February, 1943. Larvae of eight species of Culicines were collected amounting to 7,217 specimens, 5,188 of these were *Aedes simpsoni* (72 per cent) and 1,082 *U. ornata* var. *musarum* (15 per cent). There were only 10 *Aedes aegypti* larvae. During the year the axils dried out once only for a very short period in February, but the larval populations were completely re-established within 10 days of a light shower.

A collection was made of scrapings from 1,000 dry axils, and 4 living larvae were found. These were discarded and the remaining material was placed in bowls of water. By the second and third days, a total of 24 larvae of *Aedes simpsoni* and 7 of *Harpagomyia taeniarostris* had appeared. The material was discarded after a week as there were no further hatchings.

Temperature readings were taken on seven successive days in a *Xanthosoma* axil and in an adjoining Stevenson screen. The temperature in the axil seemed even more equable than that in the screen, the mean minimum and mean maximum in the axil being 17.5° and 24.5°C respectively, and in the screen 18° and 27°C.

A study of the mosquito output from plant axils was made by collecting pupae from 10 *X. sagittifolium* daily for a month. There was a constant output of pupae which were collected on 29 of the 30 days. The number of axils fluctuated between 69 and 74 and altogether 108 pupae were collected of which 95 were *Aedes simpsoni*. From the figures obtained it is estimated that an acre might contain 500 *X. sagittifolium* which could produce 5,000 *Aedes simpsoni* adults per month, 2,000 of which would be females.

Among the factors tending to reduce the output of adult mosquitoes from plant axils are the presence of the predatory larvae of *Eretmopodites*, an excessive growth of protozoa on the larvae and infection with the fungus *Coelomyces*.

The author concludes with a note on some of the common inhabitants of plant axils other than mosquito larvae.

H S Leeson

REEVES, W. C., BROOKMAN, B. & HAMMON, W. MCD. Studies on the Flight Range of certain *Culex* Mosquitoes, using a Fluorescent-Dye Marker, with Notes on *Culiseta* and *Anopheles*. *Mosquito News* 1948, June, v. 8, No. 2, 61-9, 2 figs.

These studies were made in Kern County, California, during 1946 and 1947. The mosquitoes used were *Culex quinquefasciatus* [*fatigans*], *C. tarsalis* and *C. stigmatosoma*. A method of marking was required which would leave the mosquitoes in a condition fit for tests for viruses and for dissection for plasmodia. A fluorescent dye was chosen as the marker and several were tested but on examination of 78,000 field-caught mosquitoes it was found that numerous specimens had natural fluorescent particles on their bodies, though none of these was red. It was therefore decided to use rhodamine-B, which produced a red fluorescence under ultra-violet light. At first, adult mosquitoes were reared from larvae in water which contained small quantities of rhodamine-B but this method was abandoned because of the high mortality of the larvae and the

frequent failure of the dye to carry over into the adult stage. Next, a larva were fed on sugar water containing the dye, and though the red colour was visible and was retained for several days even after death, the difficulty of getting large numbers made this method unsuitable for flight range experiments. The dusting method was finally used and found satisfactory.

The methods of rearing, marking, transporting and releasing the mosquitoes are described in detail. In 1946 of approximately 47,000 marked mosquitoes only 73 were recovered (less than one out of 650 released). In 1947 23,000 were released and only one recovered out of every 720. It was not intended to determine the maximum range of flight, but to estimate the effective flight range which is defined as the maximum distance from its breeding places that a species is able to fly in numbers sufficient to propagate a mosquito-borne disease or to constitute a nuisance.

The results are tabulated and show that in 1946, *C. quinquefasciatus*, *C. litorea* and *C. stigmatosoma* had a flight range of at least 2.5, 0.5 and 1.0 miles respectively. In the 1947 trials, the flight range for *C. tarsalis* was extended to 5 miles.

It is concluded therefore that an extensive breeding place of two of these species of *Culex* located a mile or more outside the boundaries of a controlled area, could serve as an important source of infestation and may even be so in the case of the third species. For under different conditions these mosquitoes may live longer or travel further. At present however the authors recommend a tentative practical limit for control measures of not less than 1½ miles beyond the population to be protected.

Incidental to the main study *Anopheles pseudopunctipennis* f. *novus* and *Culiseta incidens* were recovered up to 0.9 and 0.6 miles respectively.

H. S. LESTON

SMITH E. A. Aerial Spray Operations in Merced County California. *Mosquito News* 1949 Mar., v. 8, No. 1 1-8 4 figs

In a district of two thousand square miles in California three-quarters of the land produces mosquitoes mainly from irrigated pasture and irrigation of a variety of crops. [The reduction and control of the irrigation water is not discussed.] Many species of mosquitoes occur in the area and two species of *Aedes* are very troublesome biting by day and night and having a long range of flight.

Control of these insects has been by spraying from the air. Two aeroplanes have been available. One is a Stearman biplane with a single 450 h.p. engine. It carries a 130-gallon tank of spray liquid which can be discharged through a spray boom with eight nozzles. These can be operated in pairs giving a rate of discharge of 7 to 28 gallons per minute. It is also stated that the discharge can be regulated between a half and ten gallons of liquid per acre. If these figures are correct they appear to imply a very great control of flying speed. The same aeroplane carries a device for producing so-called aerosol mark by discharging an insecticidal solution into the exhaust. The device which is described in detail elsewhere [this Bulletin 1948, 43 1111] permits discharge from the machine of 1.14 gallons per minute. It is possible to change over from spraying to aerosols while in the air. The second machine known as an Aeromac is much smaller carrying only 33 gallon of spray which is discharged under pressure through ten nozzles. The output is regulated by a control of the pressure and can be between half and one gallon per acre.

The only insecticide used was DDT of which several formulations have been tested. All were applied at 0.4 lb. of DDT per acre. Whether this means used on the ground or only estimated from the output and whether the figure is for pure DDT is not clear. The aerosol from the exhaust has been put down at the rate of 0.7 lb. per acre of actual DDT.

It has been found possible to spray in spite of fairly strong wind and even during the heat of the day, and it is said that spraying has killed all larvae and 95 per cent of adult *Aedes*. The droplets are large with a mass median diameter of 150 microns. With the aerosol, the droplets are of a mass median diameter of 50 to 75 microns, and the use of this is only possible in the very early morning before thermal up-currents have been established. The aerosol has given good penetration through trees and tall grasses.

The paper contains a number of details on swathe width and other matters. The ground staff numbered two only, one man to drive the truck and the other to put out signals for the line of flight.

Most spraying was done over flooded pasture so that no serious damage to fish could result. In certain deeper waters, it appeared that the spray killed fish to a considerable extent, but did no ascertainable harm to birds. In one case when 0.8 lb of DDT per acre was discharged there was an immense destruction of insects of many sorts, some of them certainly beneficial.

If the area to be treated is large, spraying from the air is almost the only possible method and is certainly cheaper than anything one can do from the ground. Valuable figures are given about the performance of the two aeroplanes, the costs and the like.

P. A. Buxton

SACKTOR, B., HUTCHINSON, M. & GRANETT, P. Biology of the Lone Star Tick in the Laboratory. *J. Econom. Entom.* 1948, Apr., v. 41, No. 2, 296-301, 2 figs.

A method is described of maintaining a laboratory colony of ticks, which is a modification of one previously used for rearing *Dermacentor andersoni*. The tick used by the present authors was *Amblyomma americanum* and the host animal was a rabbit. Details of the life history as observed in the laboratory are also recorded.

The ticks were kept in five-inch lengths of glass tubing half an inch in diameter. At the top end these tubes were plugged with cotton wool wrapped in cheesecloth and at the bottom end with a prepared cork.

The cork was first bored through the middle and then one end and the sides were covered with 100-mesh wire cloth. The covered cork was inserted a little way into the bottom of the tube and sealed into position with a few drops of paraffin wax. To provide the necessary humidity inside the tube, one end of a cotton wick was fixed to the cork and the other end was placed in distilled water. In the laboratory, the optimum temperature for *A. americanum* was about 30°C and a humidity between 85 and 100 per cent was favourable.

When the ticks were to be transferred from the tubes for feeding on the rabbit, a stream of carbon dioxide was passed through the gauze-covered cork to immobilize them. The cotton wool plug was removed and the ticks were picked out or brushed out into the feeding boxes ("capsules") cemented to the skin of the animal.

A feeding box was made from a metal pill box, 1.75 inch in diameter. A hole 1.25 inch in diameter was cut in the bottom and a piece of chamois cloth with a hole slightly less than this was cemented to the bottom of the tin, this was then cemented to the shaved side of the rabbit. In the lid of the tin two quarter-inch holes were cut, one of which was covered with stainless steel wire gauze (100 mesh) soldered over it. The lid and bottom were sealed with adhesive tape. Ticks to be fed were dropped into the tin through the second hole, which was then closed with adhesive tape. One tin held four male and four female ticks, or fifty nymphs or five hundred larvae. When the various stages were engorged and had dropped from the host they were collected and returned

to the holding tubes where they moulted, or in the case of the females, deposited their eggs.

Two weeks were allowed between ecdysis and feeding. The average time to complete a generation was eighty-one days and the whole life cycle could be obtained in approximately four months.

H. S. Linn

JENKINS, D. W. Trembleiid Mites affecting Man. I. Bionomics with reference to Epidemiology in the United States. *Amer J Hyg.* 1948 July v 49 No. 1 22-35 7 figs. 11 refs.

Certain phases of the bionomics of the three species of *Eutrombicula* affecting human beings in the United States were studied in relation to epidemiology and control.

The known geographical distribution of *E. alfreddugesi* in the United States extends from New York and Nebraska south to Florida, Texas and California. *E. mason* is now known from the coastal states from Texas to Florida and Massachusetts also in Wisconsin and Minnesota. *E. batatas* is known in the United States only from Florida, Georgia and Alabama. The average lengths of season during which chigger larvae are active in areas throughout the United States are presented.

The known host animals for these chiggers include 83 species of mammals, birds, reptiles and amphibians. One hundred and twenty-three host records are presented based on the determinations of chigger larvae by the author. *E. alfreddugesi* and *E. mason* are found on all four groups of vertebrate hosts, while *E. batatas* is found only on the warm-blooded birds and mammals. The time of engorgement of the larvae on the host varied with the time of year being shortest in July and August.

The various types of habitats of the larvae and other stages are discussed. Comparative population counts varied from 30 to 300 larvae per minute on 5-inch by 8-inch cards. The seasonal variation in population of larvae and adults is discussed. Adults may be of value in reducing the populations of *Aedes* and *Anopheles* mosquitoes by eating their eggs. The reproductive potential of chigger adults is high—up to fifteen eggs per day were observed. A definite biweekly ovulation cycle was discovered. Individual female chiggers have lived over one year and produced offspring throughout the year.

Identification characters of the larvae and field methods of collecting and mounting are presented.

JENKINS, D. W. Trembleiid Mites affecting Man. II. Control of Larval Behavior for Disease Transmission Studies. *Amer J Hyg.* 1948 July v 48 No. 1 36-44 3 figs.

The behaviour of chigger larvae was studied to facilitate studies of transmission of scrub typhus. Reared 2-day-old larvae of *Eutrombicula mason* and *E. alfreddugesi* were used. Activity rates were measured in a glass arena having controlled temperature, relative humidity and light.

Activity of the chiggers was initiated by change in intensity or direction of light, by movement of air of the substrate or of a nearby object. The direction of movement was determined almost entirely by light. The reaction to light was positive if the larvae had been adapted to higher light intensities but was negative if adapted to lower intensities. Larvae moved in the direction of the vector of two light beams. Gravity had no effect in determining the direction of movement, and no negative geotaxis was observed.

The rate of movement was primarily determined by temperature. Movement took place between 7 and 43°C and was most rapid (3 feet per minute) at 43°C. At 35 per cent relative humidity a cold temperature orthokinesis

reaction was observed below 18C and at 85 per cent a high temperature orthokinetic effect was observed above 38C. In the normal range of activity between 18 and 38C, the rate of increase in movement rate per degree C at 35 per cent relative humidity was 1.5 times as great as at 85 per cent. With continued movement at a given temperature above 20C a decrease in movement rate (fatigue) was observed. This was greatest at higher temperatures. The rate of larval movement on the human body was about 2 feet per minute. The intensity of light did not have an effect on the rate of movement except that at very high intensities the movement was slowed down or stopped. Air movement slowed the activity rate, especially if the direction of crawling was toward the source of the air current. Movement was somewhat slower on a rough substrate than on a smooth surface. No difference in the rate of movement was observed between the two species or between reared larvae and those found in the field. The age of the larvae affected the rate of movement only slightly. A diurnal activity rhythm was observed. In the afternoon there was a marked decrease in activity.

Larval movement was stopped by sudden change in direction or intensity of light, by exposure to very bright light, or to very high or low temperature, or strong air currents. Chiggers often stopped movement and rested when fatigued at higher temperatures below the lethal level.

"By manipulating the environmental conditions around chigger larvae it was possible to almost completely control their activity. This should be of value in experimental transmission studies in preventing escape of minute chigger larvae infected with scrub typhus."

LABORATORY PROCEDURES

LEON, L. A. Diagnóstico microscópico de las enfermedades tropicales de América. [Microscopical Diagnosis of Tropical Diseases of America.] Universidad Central Publicaciones de la Facultad de Ciencias Médicas. Quito, Ecuador 1947. No 2, 108 pp. 26 figs.

The task undertaken by the author is a praiseworthy one—to assist and guide the laboratory worker in the diagnosis of disease in America. Though the title would limit the conditions to the tropics, his remarks are not confined to these regions but include any met with there. Thus, the diseases dealt with are divided into 5 groups: (1) Bacterial and Rickettsial diseases—bartonellosis, leprosy and plague; (2) fungal conditions—coccidioidomycosis, blastomycosis, mycetozoa, sporotrichosis, etc.; (3) spirochaetosis—yaws, pinta, relapsing fever, sodoku phagedaena, Weil's disease; (4) protozoal diseases—amoebiasis, the flagellates, malaria, leishmaniasis, Chagas's disease and toxoplasmosis; (5) helminthiasis—15 infestations are considered—filariasis, hookworm, onchocerciasis, schistosomiasis, paragonimiasis and the common nematodes and cestodes.

Each is dealt with under the headings of causal agent, material to be taken for examination, staining methods, what is to be seen under the microscope, sources of error [very important] and other investigations to be made for confirmation.

[The letterpress, instructions and descriptions are good, though there are signs of careless proof-reading, e.g. Cobbold and Cobbild in successive lines, and Buchereria, the illustrations are poor, about one-third of them are mere smudges and convey no information. If these were improved, the value of a good effort would be much enhanced.]

H. Harold Scott

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

AFRICAN AFFAIRS, 1948, Oct., v 47 No 189 222-7 The Liverpool School of Tropical Medicine

The Liverpool School of Tropical Medicine is celebrating its Jubilee. It is just 50 years since the School was founded by a leading Liverpool shipowner Sir Alfred Jones after Joseph Chamberlain's appeal for the study of tropical diseases.

This paper reviews the achievements of the School, particularly in regard to tropical medicine and public health in Africa. It is written primarily for a non-medical public and the story of that great School needs no re-telling for readers of this *Bulletin*. Among other things the paper recalls the Liverpool School's connexion with Sir Ronald Ross, the foundation of the Sir Alfred Jones Laboratory in Freetown, its admirable history and those well-known workers who received their early training there: the expeditions and other scientific work inaugurated; the work of Warrington Locke particularly in connexion with blackwater fever and the chemotherapy of trypanosomiasis; yellow fever control; the work of the School in two wars and especially the contribution to malaria control in Freetown; and the now familiar chemotherapeutic work on Paludrine.

This review of fifty years' progress by the oldest of the three principal centres of Tropical Medicine in Britain underlines alike the great contributions which it has made to tropical medicine and hygiene and the need for continued contributions by all concerned to the many still unsolved medical problems which exist in the tropical field.

H. J. O. D. Burke-Gaffney

KELLAWAY C. H. The Wellcome Research Institution. *Proc Roy Soc Ser B* 1948 Oct. 28 v 135 No. 890 259-70 8 figs. on 4 pls.

The Wellcome Research Institution has a distinguished history: it arose from the business firm founded in London in 1880 by the two young American pharmacists, Sir John Burroughs and Henry S. Wellcome. The name includes the various research branches of the Wellcome Foundation—the Physiological Research Laboratories, the Veterinary Research Station, the Chemical Research Laboratories, the Laboratories of Tropical Medicine, the Museum of Medical Science and the Historical Medical Museum.

The names of the eminent medical and other research workers who have been employed in the Institution are known throughout the world. It would be invidious to select from them, but readers will reserve a special memory for Dr C. M. Wenyon for 29 years Director-in-Chief whose contribution to the *Tropical Diseases Bulletin* has been continuous since the first issue in 1912, up to the time of his death a short time ago.

Dr Kellaway gives an interesting account of the Institution, illustrated by a few striking photographs.

Charles H. Kellaway

HOODLESS D. W. Central Medical School, Suva, Fiji. Prepared for the Medical Department by the Public Relations Office Fiji 1947 4 pp 21 figs.

This interesting account of the Central Medical School, Suva, was written by Dr Hoodless, who was Principal of the School from 1930 to 1946. It does not contain details of course of instruction given, but is rather an informative short history giving the broad outlines of development and scope. It is illustrated by photographs of students and the School buildings.

Since the inception of the School in 1928 up to the year 1946 225 young men have graduated and have gone to practice in the island of the Fijian group—

Fiji, Tonga, Cook, Samoa, Gilbert and Ellice, Solomon and New Hebrides. They are not trained up to the standard required for medical men in Britain, and they practise under supervision, but they are expected to treat competently all the usual diseases and accidents they meet, and to perform emergency operations of any kind if there is no possibility of removing the patient to hospital.

It is all most attractive and interesting and important. The students in the photographs look happy and full of life, but a special commendation must be reserved for the photograph of the first graduates and two of their tutors, in 1888 [See also this *Bulletin*, 1945, v 42, 416] *Charles Wilcocks*

PARRY, H B, TROWELL, H C & BERRY, W T C **Health and Agriculture Human Needs and the Pastoral Economy of Central Africa** Reprinted from *Year Book of Agricultural Co-operation*, 1947 67 pp [Numerous refs]

The paper was written by three men with African experience, two of them medical and one a veterinarian interested in uses of pasture. The matter was discussed at a conference on rural life, and this paper is the result. It deals with health and agriculture in the savannah grasslands of Africa. The central problem is to ensure that agricultural production increases more rapidly than the human population which depends on it. If it does so a better standard of living will have been achieved.

The problem is of concern to the medical man because the ability of the population to do manual work is limited by chronic infections, poor health and bad food. It is with these matters that the medical section of the paper deals, in brief and general terms.

The health problems are discussed in relation to problems of finance and administration, land usage, village life and rural planning. The authors see the great difficulty of rousing the African to work out his own salvation. The paper covers a range of subjects, which are skilfully integrated.

P A Buxton

BIocca, E, AGOSTINUCCI, G & BRONZINI, E *Ricerche parassitologiche preliminari sulle feci dei mammiferi del giardino zoologico di Roma* [Parasites among Mammalia in the Zoological Gardens at Rome] *Riv di Parassit* Rome 1948, Sept, v 9, No 3, 169-75 [12 refs] English summary (3 lines)

This is the first of a series of records of parasitological infections of animals in the Rome Zoological Gardens. The object of the examinations was twofold: to determine the general health of the animals as regards the presence of parasites and to discover whether any new parasites could be found. Altogether 244 animals' faeces were examined in the 3 months, February-April 1948: these included 3 Families of Primates, the Pre-simian Lemurs, 7 Families of Carnivora, 9 of Ungulata, 3 of Rodentia, and 1 each of Pinnipedia, Edentata and Marsupialia. The Cercopithecidae harboured most. Of 59 examined, 39 were passing *Amoeba* [the different species were not determined except division into those with an iodine vacuole (*Iodamoeba*) and those without], 16 *Blastocystis* and 15 worms or their ova. *Hymenolepis* ova were found in 2 Cebidae and in these only. *Trichuris* ova were passed by 13 Cercopithecides. A table shows the detailed findings of all the examinations made. Attention may be drawn to the presence of *Amoeba* in 8 out of 9 Suidae, 11 out of 13 Cervidae, 13 out of 26 Antelopidae and 7 out of 21 Bovidae. Except for the Cercopithecids mentioned above, helminthic infestations were rare. No amoebae were seen in any Carnivora.

Summing up the findings amoebae of one kind or other were present in 95 of the 244 (38.9 per cent.) and 65 harboured helminths (26.6 per cent.) [Future papers may reveal details of more interest. These questions have been raised at the Zoological Society of London for many years and among a much larger number of animals.]

H. Harold Scott

BOOK REVIEWS

MAIGRAITH BRON (M.A. D.Phil. B.Sc., Oxford M.B. Adelaide, Professor of Tropical Medicine Liverpool School of Tropical Medicine etc.) *Pathological Processes in Malaria and Blackwater Fever* pp. xi+430, 8 charts, 2 text figs. & 19 coloured figs. on 1 pl. 1948. Oxford Blackwell Scientific Publications Ltd. [35s.]

This is a work for the specialist in the pathology and pathogenesis of malarial infections and it will necessarily occupy a place on the shelves of all medical scientific libraries. It is a mine of information on the subject and it is surprising that so much has been condensed in a comparatively small volume. Any review of the work must, therefore, be a mere sampling of the more important aspects touched upon.

Chapter I commences with very full and accurate descriptions of the clinical signs and symptoms of the various kinds of malaria followed by suggested courses of treatment to cover all types of cases from the simple uncomplicated case to the malignant types of various kinds. There is also an account of the symptoms and treatment of blackwater fever. After this comes an account of the various parasites responsible for human malaria, which calls for no comment and this is followed by a consideration of the physiology of malaria parasites and the mode of action of anti-malarial drugs. In this connection it is pointed out that the action of such drugs *in vivo* and *in vitro* is not always comparable as some of the drugs most active *in vitro* have little effect *in vivo* in the same concentrations.

A natural follow-up to this opening is a consideration of the blood cells. The blood picture is considered from all aspects and there is cited a voluminous literature dealing with anaemia, the preferences of the various species of malaria parasites for mature or immature cells, the changes in the red cell produced by the parasites, phagocytosis of parasites and erythrocytes, and the mechanisms of haemolysis, sedimentation rate, coagulation time etc.

Chapter IV gives an account of the literature on the plasma proteins, blood sugar, cholesterol and phospholipoids in the blood in malaria and blackwater fever as well as of the inorganic constituents and blood pigment.

The general aspects considered up to this point are now followed by more detailed studies of the various organs with regard to clinical evidence of dysfunction and the pathology and pathogenesis of these dysfunctions.

The first organ to be dealt with is the liver. An account is given of the clinical evidence of hepatic dysfunction and there is a detailed consideration of liver function tests as described by various authors. The general conclusion of opinion arrived at as a result of these tests would appear to be that all patients adequately studied show some evidence of hepatic dysfunction.

There now follows one of the most important parts of the book dealing with the actual physical and physiological damage to the liver tissues and with consideration of the mode of causation of these effects. It is pointed out that even gross deviations of function may not always be accompanied by much anatomical change in structure owing to the fact that the changes in function

are reversible, and it is only when their degree becomes so great as to be irreversible that structural cellular changes become visible. The macroscopical changes are first considered, such as the general increase in size of the organ due partly to congestion and partly to hyperplasia of the cellular elements, the dark colour due to deposition of pigment and the change in consistence. The histological changes are then considered in great detail. A general picture is given of some loss of distinctive lobular structure. In conditions of congestion, the central veins and related sinusoids are filled with red cells, many parasitized, whereas in conditions of severe anaemia, the same vessels are dilated and empty. Malarial pigment is abundant in the phagocytic cells lining the sinusoids and these cells are hypertrophied and hyperplastic. The columns of liver cells are widely separated by the dilated sinusoids and all stages of degeneration of the parenchyma cells from mild granular degeneration to complete necrosis may be present. The latter changes are specially evident in the central region of the lobules. The processes of regeneration, cellular infiltration and repair consequent to these changes are then considered. The description so far is of factual findings in the liver and there now follows an important discussion on the pathogenesis of the changes described. In a comparatively short review it is possible to give only the briefest summary of this section and the original must be consulted by advanced workers on malaria.

Stasis and thrombosis due to mechanical obstruction of the capillaries and sinuses by red cells, parasitized or normal, or by other mechanically operating factors, is uncommon. The lesions, therefore, which resemble those found in right heart failure and are caused by anoxia brought about by interference with the return of venous blood from the liver, must have some other cause. The most probable cause may be looked for in active obstruction to the efferent venous flow caused by changes in the venous blood vessels and this may be due to a possible sphincter mechanism in the hepatic veins. The result is a stagnant anoxia similar to that obtaining in heart failure.

Additional factors in bringing about this result might be the hypothetical malarial toxin, by-products of the metabolism of the parasites and, possibly, autoantigenesis of the parenchyma cells. The reason for the central distribution of the lesions in the lobules is not known, but various hypotheses are put forward.

An equally important section deals with the kidney in malaria and blackwater fever. As in the case of the liver, there is first a description of the clinical signs of involvement of the kidneys in all the common forms of malaria. These signs are temporary proteinuria in the acute malarial attack, without involvement of the nephron. More rarely, the nephron may be involved with definite tubular damage but this is more common in the course of chronic, recurrent, or repeated infections, especially in quartan malaria. As regards renal dysfunction in acute malaria and blackwater fever, the evidence is conflicting but there is general agreement on certain points. Thus, acute renal symptoms are commonest in *P. falciparum* infections and vary from simple albuminuria to definite nephritis or nephrosis. Less often the picture simulates an acute streptococcal nephritis with oliguria, uraemia and nitrogen retention, while in recurrent malaria, especially in *P. malariae* infections, the exacerbation of malaria may be accompanied by increase in the existing renal damage leading to death by uraemia.

The pathological changes, both those of a general nature and those specially related to the parenchymatous tissues, are described in acute and chronic malaria and the changes in blackwater fever are separately considered. In the latter case there is general agreement that few changes are found in the glomeruli, most of the damage being confined to the tubules where the epithelium shows degenerative and necrotic lesions and the lumina are plugged with casts.

The chapter dealing with the pathogenesis of the renal lesions is extremely difficult to summarize on account of the number of conflicting theories based largely on animal experiments, and the account should be read in the original. The conclusion is drawn that the pathogenesis of the renal lesions and renal dysfunction in malaria and blackwater fever are essentially identical and not dissimilar to that of syndromes arising in other conditions where there is renal anoxia. The basic aetiological factor is probably anoxia of the renal tissues especially of the cortex and for this the term renal anoxia is proposed. The renal anoxia it is suggested arises from reduced renal blood flow affecting chiefly the cortex and often accompanied by a general peripheral vascular collapse. There is probably in all cases a reduction in total renal blood flow and a redistribution of blood flow in the kidneys resulting in anaemia and consequently anoxia of the cortex.

The brain is the next organ to be dealt with. Clinical manifestations of involvement of the brain have such an immense literature that no attempt is made by the author to deal with them and the reader is referred to the many reviews on the subject. The pathological changes in the brain both macroscopical and histological are described on conventional lines and need not be enlarged on beyond saying that the descriptions relate almost entirely to materials derived from fatal cases of *falciparum* malaria and blackwater fever.

The pathogenesis of the brain lesions is less complicated than that of the liver and kidney lesions. The lesions most consistently present involve the blood vessels capillaries and small arterioles especially those of the white matter. The older view that the vascular damage is due to obstruction of the blood flow in the smaller vessels accompanied by diapedesis of red cells and that degenerative changes in the nervous tissues are the result of deprivation of their blood supply may have to be modified. The latter opinion may still be correct in as much as the condition will necessarily lead to anoxia of the tissues but the cause of the stasis is probably not direct obstruction but concentration of the corpuscles due to loss of fluid from the vessels through damage to their endothelial lining rendering them permeable. The primary cause or causes of these effects are more obscure and are discussed at some length.

The spleen and bone marrow are next dealt with. The naked-eye and histological appearances are described and the pathogenesis of the changes is considered.

The adrenals in malaria are discussed in a short section. Clinical symptoms in some kinds of pernicious malaria are similar to those of adrenal insufficiency to such an extent as to have been remarked upon by many workers. However symptoms closely resembling traumatic shock may sometimes be seen in malaria without obvious adrenal damage and it is difficult to assess accurately the rôle of the adrenals in the pathogenesis of malaria. Clinical evidence is based on the asthenia, lowered arterial pressure and peripheral vascular failure with skin pigmentation abdominal cramps etc., as well as on chemical evidence on the blood and tissues but it has to be noted that conditions such as shock and anoxia which are concomitant of severe malaria may give rise to the same chemical evidences.

The heart in malaria as an organ seldom seriously affected, is dealt with quite shortly and call for no special mention.

The concluding chapter deals with some pathological processes in malaria not covered in the previous chapters. The paroxysm is considered a reaction to a non-specific pyrogenic agent, the precipitating factor being a yet undetermined. Anoxaemia the rôle of haemozoin and circulatory phenomena, are also considered.

The tissue responses are no more than touched upon and this also applies to the question of immunity, natural and acquired

Misprints and such minor blemishes are conspicuous by their rarity and those mentioned here are noted merely for correction in any subsequent edition. Thus, in the description of *P. malariae* on pages 43 and 44, no reference is made to the presence of Ziemann's dots in the cytoplasm of the red cells although the absence of Schuffner's dots and Maurer's dots is mentioned. On page 323 "Paisseau" is wrongly spelt in the last paragraph.

In a book covering so large a field, compilation of published work must form a great part and the sources of information are given in brackets. These brackets become somewhat wearisome in continuous reading although the reviewer can offer no substitute for them and these very references make the work one of great value.

It is a pleasure to record the smooth phraseology and excellent construction of sentences throughout the work, which make for complete clarity in the exposition of the author's views, a merit often lacking in scientific works.

H E Shortt

GIGLIOLI, George [M D It, M R C P Lond, D T M & H Eng, Medical Adviser, B G Sugar Producers' Association, etc] *Malaria, Filariasis and Yellow Fever in British Guiana. Control by Residual D D T Methods with special reference to Progress made in eradicating *A. darlingi* and *Aedes aegypti* from the Settled Coastlands.* With Foreword by F L SOPER, M D pp x+226, 47 figs 1948 Mosquito Control Service, Medical Department, British Guiana

There has been no publication with a more important bearing on the policy of malaria than this since the appearance of SOPER and WILSON's "*Anopheles gambiae* in Brazil, 1930 to 1940" [this *Bulletin*, 1944, v 41, 324]. That account described for the first time how anopheline species could be eradicated from large areas by the time-honoured methods of larval destruction. This is the first really full account of which the reviewer is aware which sets out all the details of anopheline eradication by the new means of destruction of adult mosquitoes with residual insecticides.

Lest too much should be assumed on the transferability of data and conclusions, it is well to emphasize the author's words that today, as in the past, generalizations are not possible *in re malariae*. His findings and conclusions refer exclusively to British Guiana mosquitoes and British Guiana conditions. But with this necessary qualification the work described should set a standard for much else.

British Guiana lies between 1° and 8°N. It has a population of 375,819 souls, of whom 90.5 per cent are concentrated in a narrow coastal belt which is from 2 to 4 miles broad, and where much of the land is at or below sea level and devoted to the farming of sugar cane. The climate is hot and moist throughout the year, the annual rainfall (94 inches) is distributed throughout the year, but mainly occurs in the spring and early summer. Malaria is endemic, normal spleen rates ranging around 40 per cent except in some small favoured areas where they range round 10 per cent. Sixteen species of anophelines are recorded, and of them three may be malaria carriers, *Anopheles darlingi*, *A. aquasalis*, and *A. albivittatus*. The first of these is undoubtedly an important carrier responsible for the transmission of malaria over most of the populated coastal belt, and the other two may have an influence in restricted, less malarious, areas.

A. darlingi is naturally a forest species, artificially encouraged in the open cultivated coast lands where it breeds profusely in the irrigation system, its

associated swamps and in the cultivated fields themselves. The adult is very domestic, shelters exclusively in houses and feeds almost entirely on human blood. The houses are for the most part built of sawn hardwood, sometimes with paper or other decoration.

The potential value of DDT in these conditions was realized in 1944 and the initial experimental work was carried out by SYMES and HADAWAY in 1945 (this Bulletin 1945 v. 42, 785). Since then adult mosquito destruction by DDT has been extended through the entire area of the populated coastal strip under a dual organization in which Government and the planting industry have cooperated.

Most available varieties of material and apparatus have been tried and are reported on. After the initial trials, a 5 per cent. solution of DDT in kerosene was adopted as the standard material. It was applied mainly from stirrup pumps with an improved, locally made nozzle at a dosage which rarely varied greatly from the standard 150 to 160 mgm. per sq. ft. (5.3 to 5.7 ounces per 1,000 sq. ft.) which was considered best suited to local conditions. Observation showed that an interval of 8 to 10 months between sprayings kept up a sufficient lethal effect and a normal period of 3 months was decided on.

The author realizes and emphasizes that the non-absorbent nature of the typical wall surface and the habits of *A. darlingi* were greatly in his favour. Treatment of houses resulted in an immediate great reduction in the numbers of all anopheline species and marked but short-lived reduction in the numbers of *Culex fatigans*. When some but not all, houses were treated anopheline breeding was maintained but when all houses in any one locality were treated, the reduction in *A. darlingi* was so great as to end in a total cessation of breeding though no anti-larval measures had been applied. For instance in one area partial treatment was carried out in 1945 and 1946 in which years 3,270 and 713 potential breeding areas were searched and 71 per cent. and 23 per cent. found positive. In 1947 all houses were treated and all of 867 breeding places searched proved negative. Extension of this principle of complete treatment throughout the coastal belt has resulted in the complete eradication of *A. darlingi* from it.

The eradication of this very dangerous malaria carrier has been achieved by DDT used exclusively as a residual spray applied to the interior of houses completely ignoring all phases of hydrological control. These results are all the more significant as a more hopelessly difficult hydrological situation could hardly be conceived.

The effects on malaria are equally marked but much more delayed in their appearance. There was a steady slow decline in the spleen rate—in a typical example records before and at roughly six-monthly interval after the first application of insecticide were before treatment 71.9 after treatment 48.5 31.0 28.2 17.9 12.2 8.0 4.0. Changes in the parasite rate did not follow this course. In the same example the corresponding parasite rates were before treatment 40.3, after treatment 18.0 30.7 33.3 27.1 41.1 6.9 3.0. On analysis of the slow reduction it is shown that *Plasmodium falciparum* infections rapidly decreased, in most places disappearing within 4 months. *P. vivax* infections persisted longer and *P. malariae* was yet more obstinate. The numbers of parasites of all three species decreased quickly so that a couple of years after the initial treatment few films contained more than two or three rings the species of which was difficult to identify.

The average annual cost for establishing and maintaining control including repeat spraying and all overheads amounted to 5.43 per house or 0.637 per c. pad. As *A. darlingi* persists in the interior forests some large part of this must be considered as a permanently recurring expense.

Filaria, due to *Wuchereria bancrofti* carried by *Culex fatigans* can be shown in about 16 per cent of the population by a single blood film examination. This mosquito is much less susceptible to destruction by DDT than is *A. darlingi*, and cannot be brought under complete control by it unless anti-larval measures are simultaneously practised. The author fears the risk that strains which are highly resistant to DDT may develop. However it is partially susceptible, not only are its numbers greatly decreased but its normal span of life is lessened in a treated area so that mature embryos are rarely seen, and the author is hopeful that transmission of the worm may be greatly impeded. The long life of the parasite in man makes factual observation on this point difficult until a new generation of people brought up under the new conditions can be examined.

British Guiana has suffered from urban yellow fever and is within the endemic area of jungle yellow fever so that *Aedes* control is constantly necessary. In the past this has been carried out in townships by standard measures directed against breeding, by which it had been found possible to secure eradication in any locality in four months at a cost of \$4.18 per house or \$1.39 per head of population. Trial showed that, with DDT residual spray, this result could be achieved in 13 weeks at a cost of \$1.76 per house or \$0.47 per head of population. Re-infestation of breeding places occurred at about 10 months after treatment of houses. In, apparently, townships where regular spraying for the control of malaria is not needed, a combination of adult destruction with sealing of barrels, drums and suchlike breeding places has been adopted as the most economical and effective.

The reviewer has tried to excerpt the outstanding points from a most comprehensive report, omitting reference to dozens of important points which are fully described. Despite the pertinence of the original warning, this is a publication of very wide interest.

G Macdonald

STITT, E. R. [M.D., Ph.D., Sc.D., LL.D., etc.], CLOUGH, Paul W. [M.D., etc.] & BRANHAM, Sara E. [M.D., Ph.D., Sc.D., etc.] & Contributors. **Practical Bacteriology, Hematology, and Parasitology**. Tenth Edition. pp. xiv + 991, 7 coloured pls & numerous text figs. 1948. London. H. K. Lewis & Co. Ltd. [50s.]

Each successive edition, this being the tenth, of this deservedly well-known text book has been a matter of interest and importance to laboratory workers dealing with medical subjects.

This latest edition is under the names of STITT, E. R., CLOUGH, P. W. and BRANHAM, S. E., the last-named being added for the first time, while the name of M. Clough has been dropped. In size, the work has changed little and the format is similar to that of previous editions.

As in previous editions the majority of the illustrations are excellent but there is a considerable number of new figures, not all of which are happily chosen.

The present edition, as the previous one, is divided into four main sections dealing with Bacteriology, Haematology, Parasitology and Clinical and Pathological Examination of Body Fluids and Organs. These sections are followed by an appendix describing various laboratory procedures not previously dealt with in the text. While it is impossible adequately to review a book of this size in a limited space, a short consideration of the various sections is necessary merely to denote their scope and usefulness.

Bacteriology

This is dealt with in 12 chapters, totalling 373 pages which comprise more than a third of the entire book. Most aspects of bacteriology and bacterial

immunity are dealt with and the section also contains chapters on the filtrable viruses and on medical mycology. One might suggest that the latter at least possibly deserved a section to itself. Description and method of identification of bacteria causing disease are described and a number of useful summary tables is included. The spirochaetes, rickettsiae and filtrable viruses are adequately dealt with within the limits of space available but cultivation of the filtrable viruses is given not much more than half a page on pages 17 and 18. Bacteriophage is similarly dealt with in a page and a half and no account is given of its use in typing strains of bacteria. Medical mycology receives somewhat less space than its importance especially in the tropics would warrant but it cannot be said that anything of great importance is omitted. One quite obvious error is the photograph on p. 14 purporting to depict *Leishmania* in heart muscle for comparison with a lesion due to *Trypanosoma capsulatum*. It is clear that the first figure illustrates infection of heart muscle with the *Leishmania* form of *Trypanosoma cruzi* and the mistake is unnecessarily emphasized on page 522 where the identical photograph is correctly given as an illustration of infection with that parasite.

The chapter on immunity and hypersensitiveness contains much in little space and the remaining two chapters describe most of the media and staining methods likely to be used in general laboratories.

In this large section it is inevitable that there should be some error and omissions of which, apart from that already noted one may be mentioned since it occurs in the important table on page 18 listing diseases of animal transmissible to man. Obvious omissions here are leishmaniasis, American trypanosomiasis, balantidiosis and tick borne relapsing fever in all of which the natural reservoirs may be animals.

Haematology

This is a good section. The techniques of blood examinations are described quite fully and there follows a description of the normal and pathological elements of the blood. From this there proceed naturally the description of various blood diseases.

The name of such a well-known fauna Mayer haemaphysom (wrongly) felt Meyer on page 329.

Parasitology

This is one of the major sections and is divided into part dealing with Protozoology, Helminthology and Entomology. The first part of the section deal with Medical Protozoology and commences with a table of protozoa causing specific human diseases. This seems fairly complete but *Toxoplasma* is omitted although on page 535 it is referred to as a protozoan (sic). On the other hand *Plasmodium knowlesi* is included although the fact that it is inoculable to man does not make it a protozoan causing a specific human disease.

On page 488 again *P. knowlesi* is listed as a cause of disease in man and in the same connexion the name of such a well known worker in malaria, Sinton is wrongly spelt. In the same small list the equally well-known Stephen is also wrongly spelt.

On page 494 in talking of the gametocytes of malaria the statement "the gametocytes do not produce symptoms and disappear if not picked up by the appropriate mosquito" The meaning of this is quite obscure. On page 495 in describing the reason for the commonly applied titles benign tertian, malignant tertian and quartan the reason given for the first of these titles is "because the untreated infection usually terminates in a few days or weeks without serious effects on the host." In view of the notorious tendency

of this parasite to resist cure even when the natural defences of the body are aided by anti malarial drugs, this statement is difficult to accept

The section on diagnosis of malaria in man, page 497, gives one the impression of an armchair approach to a practical problem. In practice, if thin and thick films were consistently negative, is it probable that recourse would be had to inoculation of blood into a susceptible person or to sternal puncture even if the latter, as suggested, should replace "the hazardous splenic puncture?" Also, on page 502 under the heading of *Plasmodium knowlesi* what is the meaning of the words "while this parasite is not likely to be encountered without previous knowledge of the species involved"? It is not a knowledge of the species which would prevent it being encountered but the fact that it is not a human species. The section on malaria, apart from such small but irritating inaccuracies, is not among the best in a work where such high standards have been maintained in the past.

The blood flagellates occupy 12 pages, of which the space of 4 pages is taken up by illustrations. As regards culture media, NNN medium is dismissed after mere mention, although it is the standard method used in many countries. This is a pity as it is so easy to prepare and so generally useful. In dealing with diagnosis, the complement fixation test for kala azar, involving the use of acid-fast organisms in preparing an antigen, is not discussed specifically although it has been so favourably reported on in India.

The intestinal protozoa are adequately dealt with but one would have expected more information than is given on the gross and microscopical appearances in liver abscess due to *E. histolytica*.

The chapters on helminthology give a good account of all the parasites likely to be encountered in man and most of the information a medical officer in the tropics might require is to be found in the 96 pages devoted to this section. There are some minor errors such as on page 596 where *Loa loa* (Cobbold 1864) Castellani and Chalmers, 1913, is obviously wrong as regards the second date. *Entomology*

This is a small section of only 60 pages. Scrub typhus, which was an important war disease in the Far East and Pacific war areas, is dismissed in 12 lines on page 177 and the vectors in 6 lines on page 662. The space given to the vectors is less than that allotted to butterflies and moths.

In dealing with the genus *Phlebotomus*, some of the vectors of kala azar in the Mediterranean area and in China are given as though they were proven without doubt.

The mosquitoes are hardly given the space their world-wide importance would appear to earn and the two pictorial keys to adults and larvae, refer only to species found in the United States.

Part IV of 176 pages is one of the main sections of the work. It describes all the clinical and pathological examinations likely to be required in respect of body fluids and organs. The section is excellent and it is not necessary to pick out particular details.

The index is disappointing. There is no mention in the index of the mouse protection test in yellow fever although it is described in the text. Similarly "sternal puncture" is not mentioned in these words although described in the text.

Tissue culture is looked for in vain in the index and the same applies to splenic puncture the technique of which does not appear to be described. Many other instances could be cited of facts presented in the text but which it would be difficult to locate by the index.

So far it is chiefly defects and omissions which have been pointed out in order that they may be remedied in the next edition. This has always been, and still is, so useful a book that the issue of further editions is assured.

The scope of the work is so wide that one is tempted to find so few of the real essentials omitted and the book can be confidently recommended to workers in laboratories where an extensive library does not exist and especially to those who may wish to have only one omnibus work to carry all in it.
H. E. SALT

BREED Robert S. [New York State Experiment Station (Cornell University) Geneva New York] MURRAY E. G. D. [McGill University Montreal Quebec Canada] & HITCHENS A. Parker [University of Pennsylvania Philadelphia, Penn.]. *Bergey's Manual of Determinative Bacteriology*. Sixth Edition pp. xvi+1529 1948. London Baillière Tindall & Cox, 7 & 8 Henrietta Street W.C.2. [82s. 6d.] [Review appears also in *Bulletin of Hygiene*]

The new edition of this work is an imposing manual. It is over 1400 pages long and contains an enormous amount of information—descriptions of 30 new species are included. A saving of space has been effected by using double columns for each page and the result is very pleasing. A further innovation is the inclusion of an index giving the source and habitat of different bacteria. This should be extremely useful. It must have taken a lot of time and labour to compile and it is natural that some inconsistencies should have occurred. For instance twelve organisms are listed under "Conjunctivitis" but only three under the "Eye" six organisms are listed under "Arthritis" but only two under "Joints" and so on. The book as a whole though bulky is well produced—it opens flat at any part and the pages do not stick together—it is admirable therefore for reference work and is a credit to both the authors and the publishers.

Most students of bacteriology are already well acquainted with the principles and subject matter of the book, and there will be no need to remind them of the extent to which the authors for the sake of taxonomic completeness have carried the classification and nomenclature of micro-organisms. Not only the true bacteria about which we still know far too little are neatly described, but even the bacteriophages and filtrable viruses whose very nature is in doubt, are duly provided with their names and ranks. Serious writers are therefore asked to refer to a staphylococcal phage as *Phage aureus* to the lymphogranuloma virus as *Mycogranuloma lymphogranulomatis* to the foot-and-mouth virus as *Hoeds pecoris* to the mumps virus as *Rubella infantum* and to the yellow fever virus as *Charon erugatus*.

The old die-hard breed of bacteriologists who would admit no generic extensions beyond *Bacillus*, *Streptococcus*, *Staphylococcus* and *Mycobacterium* have undoubtedly lost the day and good terms such as *Brucella*, *Chlamydia* and *Salmonella* have come to stay—but it may be doubted whether it is wise to pursue the road to classificatory completeness as far as the present authors have done. As a concordance to the book of descriptive bacteriology *Bergey's Manual* is indispensable. As a guide to taxonomy and nomenclature it alone may perhaps be doubted.
C. A. HADSON

GHOSH Barendra Nath (F.R.F.P. & S. (Calcutta) F.R.S. (Lond.) etc.) *A Treatise on Hygiene and Public Health with special reference to the Tropics*. 12th Edition pp. xvi+764 153 figs. 1948. Calcutta New Publishing Co. [Rs 15 or 22s. 6d.] [Review appears also in *Bulletin of Hygiene*]

Yet another edition of this excellent work has appeared within the year of the preceding and it bears all the signs of very careful revision and unremitting energy in bringing the information up to date in climatology

redundancies and in re-writing whole sections instead of merely patching. To speak of general matters first. The whole format has been changed, recast. The print is larger and clearer, nevertheless by judicious elision of what is, or what has in the course of time become, redundant, by placing subjects of subsidiary importance formerly in large print into small print, in spite of many additions—and these are to be found in every chapter—the author has not materially increased the size of the book, it is only 54 pages longer than the last edition. Ten redundant figures have been omitted, five new ones appear and another, the Normal or Probability Curve, is given in a new and better form. It is a pity (this may be purely a personal view) that the illustration of the artificial cooling of a room has been dropped. An error in the numbering of figures has crept in, those on pp 307 and 352 are both numbered Fig 64, and those on pp 366 and 379 both Fig 68. The titles of two chapters have been changed. Chapter 23, Restraint of Infection becomes Control of Infection, and Chapter 28, Vital Statistics is enlarged to Statistics and Statistical Methods. Though it is essentially a "one-man book", the author has availed himself of a judicious choice of helpers whose share is generously acknowledged. Proof reading has been carefully done, misprints are few, only a dozen have been noticed in the whole work of over 700 pages.

So much for general points, we pass on to some in more detail. The Introductory chapter on Preventive Medicine and Public Health Administration is nearly double the length of that of the 11th edition and is a great improvement. Chapter I on the routine bacteriological examination of water is now in small print. Chapter II has additional sections on Air Disinfection and on War Gases, and that dealing with the amount of air required for ventilation has been rewritten. Some additions have been made on examination of the ventilation of a room, and on p 97 estimation of hydrogen by katharometer is mentioned, but the instrument is not described. Into Chapter III on Occupational Hygiene there have been several subjects introduced, notably improvements in the status and welfare of the industrial worker, his housing and nutrition, maternity benefits, the establishment of crèches and first-aid posts. The dangers of manganese poisoning, omitted in previous editions, are now dealt with. This chapter will in the future assume even more importance when the papers (more than 200) presented to the recent International Congress on Industrial Medicine held in London last September are published.

Chapters IV and V, on Soil and Housing, have been revised and sections previously in large print are now relegated to small. Chapters VI-X on Food have been added to and amplified, especially the sections dealing with vitamins and food preservation. Fish poisoning deserves more than the cursory mention accorded to it in 11 lines. Much of what was written on Eugenics in the preceding edition in chapter XV devoted to Personal Hygiene has wisely been omitted in the new issue, notably the summary of the policy of the British Eugenics Society. No mention is made of dhobie itch, a troublesome condition in the tropics, or of its varieties about which a good deal has been written in late years. Chapter XVIII, on Maternity and Child Welfare, still retains the figures of ten and more years ago. It should be possible to obtain more recent data on infant mortality in England and Wales than those of 1938, those in Madras city in 1932, and in Calcutta and Bombay in 1937 and 1938 respectively.

In Chapter XXI, Infection and Carriers of Infection, space has been saved by substituting small print for the section describing types of infecting organisms and a section dealing with escape of organisms from the respiratory, intestinal and urinary tracts has been inserted. The incubation period of whooping cough has been changed from 4 to 14 days to 7-14 days. This is known to be variable but the limits are thought to be wider than these, 3 days

to 3 weeks has been claimed. The diction on p. 401 is a little doubtful. We must repeat regarding chapter XVII the same criticism which was made on the previous edition that without indication of the magnification of figures for merely measurements stated in the text the relative sizes of helminths depicted are liable to mislead—for example on p. 44 *Gastrodiscoides hominis* will appear to have four or five times the bulk of *Fasciolopsis buski*.

Chapter XVII is one of the most important in the book dealing with Epidemiology and Preventable Diseases. Incorporation of Shortt and Garnham's work on the exo-erythrocytic stage of the malaria parasite (not published until March 1948) indicates how closely to date the author has brought his observations. Inclusion of remarks on Gamexane is further evidence of this as is the inclusion of a recent graph of cholera mortality in Bombay in 1945-48. No mention is to be found of the annular erythematous rash of African trypanosomiasis and the American form is still wrongly called Chagas disease. *Nosoprylus fasciatus* is given its discarded name *Ceratophyllus*. The use of live vaccine in plague prophylaxis is introduced. The statement repeated in former editions, of second attacks of yellow fever has been expunged but on the other hand not many who have lived and worked in countries where enteric fever is common will agree that "relative immunity lasts for a long time frequently for life." Sir Almroth Wright's figures of the results of TAB inoculation in the First World War are given but none more recent. In view of the large epidemics of alastrim which may occur and in fact have occurred this type of smallpox deserves more than transitory mention in a couple of lines. The introductory section on Dietetic Diseases is good and new. One still looks in vain for remarks on infantile beriberi and Dr Fehly's work in connexion therewith. The rabies section is confused—remarks on the virus actually refer to the Negri body and not to the filtrable virus and mention we think should be made that the more acute and more rapidly fatal the disease the smaller are the Negri bodies and consequently the harder to find and the greater likelihood of their being missed. The explanation accounting for the variability of incubation period of rabies need amplification. The account of leprosy has been practically rewritten and brought up to date especially that part which deals with control and prevention. Finally a third appendix has been added the P.H. (Aircraft) Regulations 1938, in conformity with the International Sanitary Convention for Aerial Navigation.

The above criticisms are not made in any carping spirit but as suggestions for the author's consideration. The book remains one of the best work on Public Health known to the reviewer and the author is to be most heartily congratulated on the success of his efforts. H. H. Gold Scott

The Nomenclature of Disease drawn up by a Joint Committee appointed by the Royal College of Physicians of London. 7th Edition (being the 6th revision subject to Decennial Revision) pp. xiii 384 1944 London H.M. Stationery Office. [8s. 6d.] (Review appears also in *Bulletin of Hygiene*.)

Since the sixth edition of this work was published 17 years ago, numbers of classifications of disease have been produced in Britain and the United States. These have embodied statistical indices and it is recognized that while statistical classification and a nomenclature are common ends, they should not be confused. In the introduction the distinction made between classification from authoritative sources and it is emphasized that the S.I. Committee

charged by the Royal College of Physicians of London in 1944 with the compilation of the present work "has been solely concerned with providing a Nomenclature of Disease, though it has designed its classifications to serve as a basis for a statistical code" The list of members of the Committee and Sub-Committee is an impressive one, occupying three pages, and it is evident from the names that no pains were spared to obtain the most expert advice available in the preparation of each of the many sub divisions of the subject matter That it should be nearly five years since the work was begun makes it inevitable that a great deal of the results of medical research, especially during wartime, should not be revealed in these pages This is a failing which can hardly be overcome, particularly at the moment when publishing difficulties are manifold, since a task so vast and ever expanding must need revision almost as soon as it has been completed, if it is to be up to date Nevertheless, the Nomenclature is as up to date as it could possibly be made and the time which it has taken to compile is also evidence of the immense amount of care and labour which has gone into its preparation

The volume opens with an aetiological classification of disease, under such general headings as mechanical, structural, functional, metabolic and pre-natal influences There then follow the aetiological agents in diseases due to plant and animal parasites The diseases themselves are first named alphabetically and lists of pathogenic bacteria, spirochaetes, rickettsiae, viruses and fungi follow These in turn, are followed by lists of protozoa, helminths and arthropods, with the diseases caused or carried by them and their habitat, where this can be defined An excellent feature is a list of diseases carried by arthropods, with full lists of vector species There then follows the aetiology of diseases due to intoxication, physical agents, circulatory, blood, nervous and undetermined causes

The second part of the book gives a systematic list of diseases on a regional basis and this occupies over two-thirds of the volume

A feature of particular value is the appended list of eponyms, which occupies some 14 pages and includes a large number of diseases commonly having eponymic descriptions, with their scientific definitions attached Two final pages in this list include diseases named after locality and occupation the former is perhaps of questionable value, since the number of geographical and topographical attributes given to many diseases is very large, and the inclusion of some, but not all, of the well-known names is, perhaps, apt to be confusing For example, cutaneous leishmaniasis is given as the definition of Baghdad Sore, Delhi Sore, Lahore Sore, Oriental Sore and Natal Boil while Aleppo Boil and Biskra Button are shown as Baghdad Sore A number of geographical names, besides the more familiar ones, are given for brucellosis and Hong Kong ear is defined as aural aspergillosis [though in the reviewer's experience, a common tropical ear infection in which *Ps. pyocyanea* is prominent has been named in turn after most of the better-known tropical cities] Egyptian splenomegaly is defined as Kala Azar, though it should perhaps correctly be reserved for a feature of schistosomiasis

These very minor criticisms among tens of thousands of entries will be regarded, it is hoped, as evidence not of defects in the work, but of its outstanding lack of them This Nomenclature is monumental in scope and presentation alike because of the immense amount of practical and definitive information which it contains, it should never be outside easy reach of any medical workers' hand, for without it, it would be difficult for him indeed to maintain in his writings such a standard of wide and accurate definition as medical activity demands and the present compilers have achieved

H J O'D Burke-Gaffney

NEW YORK STATE DEPT OF HEALTH Laboratory Manual for Physicians Aids in Diagnosis and Treatment. Ninth Edition pp vii+129 8 in. 1948. Issued by Division of Laboratories and Research Albany. [Review appears also in *Bulletin of Hygiene*]

The staff of the Division of Laboratories and Research, New York State Department of Health are in a position to speak with a considerable weight of authority on laboratory services since for example in the year 1947 alone the total number of tests performed in their laboratories amounted to more than six million.

The need for and value of a Manual of this nature are made clear in the

the New York State Association of Public Health Laboratories maintain a standing Committee on the use of laboratory facilities and that it distributes appropriate leaflets. This *Laboratory Manual* is directed toward the same end namely of providing concise and practical information for the guidance of clinicians in selecting taking handling and despatching material for laboratory examination. The Manual also contains information regarding the Public Health Law the Sanitary Code and the U.S. Postal Laws and Regulations in so far as these are relevant.

The Manual opens with a description of the organization of the Public Health Laboratory service in the State. The second part deals with admission of specimens, specimen outfits and their preparation biological products their distribution, use and reactions which may follow them, and the precautions to be taken. There then follows the main part of the Manual, occupying some 80 pages namely an alphabetical list of communicable diseases and the laboratory aid appropriate to them. This includes bacterial, protozoal, helminthic, virus and rickettsial diseases their nature the source of specimen to be taken and the best means of obtaining them followed in each case by an admirable description of the relevant therapeutic and prophylactic products provided by the laboratory with their dosages and means of administration. Further parts deal with examination relating to water sewage dairy product and with food utensils. There are brief chapters on recording and reporting results and of distribution of laboratory supplies.

The book is essentially for local use and will prove of most direct use to those having contact with the Division itself but it is full of useful practical information from which any clinician requiring laboratory services should profit and which fill a need existing in medical circles everywhere. Within little more than 120 pages it provides the practitioner with all the essential information which he may need regarding his contact with a routine laboratory and its service to him.

In the closing paragraph of the Introduction it is pointed out that cardinal principle of the Division has been that laboratory services should be consultative that close relations are necessary between the physician and the pathologist. This course should go far in promoting better relations in general and practical practice.

H. J. O'D. Lusk-Jaffer

VORER HANS. Grundriss der Tropenkrankheiten. 2. Aufl. of Tropical Medicine 143 pp 1947 Stuttgart Georg Thieme Verlag.

Restrictions which have been in force as the result of the recent war have rendered it desirable to produce a practical handbook in small compass for

the use of students attending courses at the well-known School of Tropical Medicine in Hamburg. The need for such a work has become more urgent because of the impossibility of acquiring standard books under the present conditions and the unsuitability of the larger monographs for the average student. The condensed nature of the handbook necessarily renders it unsuited for a detailed review. A list of the contents, however, gives some idea of its comprehensive nature and its adequacy for the objects it has in view.

The subjects considered are arthropods as disease transmitters, protozoal, spirochaetal, bacterial, virus diseases, rickettsias, helminthic diseases, fungus diseases, nutritional diseases, snakes, other poisonous creatures and laboratory methods. Illustrations are lacking.

Considering the synoptical character of this booklet the amount of practical information it contains is very considerable. *P. Manson-Bahr*

WLYER, Fritz. Grundriss der medizinischen Entomologie. Mit Einschluss der uebrigen medizinisch wichtigen Gliederflüssler. [Essentials of Medical Entomology.] 2nd Edition pp viii+132, 63 figs. 1948. Leipzig. Johann Ambrosius Barth.

The present book is a short introduction covering the whole range of medical entomology. It is written for the man with only a slight training in entomology and would be suitable for medical men taking some such course as that for a Diploma in Tropical Medicine. About half the book is general and half deals with the insects in a systematic arrangement.

The book opens with an account of the general classification and anatomy of Arthropods. The author then passes on to give an account of the outstanding points in the physiology and life history of insects. He refers to such subjects as growth, moulting and metamorphosis, the effect of temperature on the length of the life cycle, hibernation, which is closely dependent upon climate, and particularly temperature, and the climatic limits within which biological processes are normally conducted. Later in the book, the ticks are dealt with in a similar manner. The general account of parasitism gives a formal statement of the meaning of predator, parasite, etc., and points out that parasitism may be permanent or temporary, highly specific or not; it may occur at various stages in the life history. There are certain cases in which parasites are fatal to their prey. The author deals in a general way with venomous arthropods.

About half the book, some sixty pages, takes the Orders, Families, etc., of Arthropods which are of medical or veterinary importance and gives their morphological characters, the essential points in life history and in more detail an account of the blood sucking forms. There is some tendency to give a disproportionate amount of space to insects which are of very minor importance. For instance, the dragon flies which are only of interest because one or two of them are intermediate hosts of a flat worm parasitic in poultry, receive half a page. A similar space is given to the Rhagionidae, a family of flies of which a few species are blood suckers, one or two of which occasionally bite man in America and Australia. On the other hand the Anoplura or sucking lice of man and cattle receive only one and a half pages.

The author has certainly provided a brief account which covers the whole range of the subject. There is no equivalent recent book in English or French. His approach to the subject is zoological and for the most part anatomical and his presentation is solid, orderly and formal. The reader may well ask whether something could not be done to make these dry bones live. *P. I. Buxton*

ZELIFF C. CONNOR (M.S. Ph.D., Assistant Professor of Human Parasitology and Zoology, the Pennsylvania State College). *Manual of Medical Parasitology with Techniques for Laboratory Diagnosis and Notes on related Animal Parasites*. pp. xh + 159 68 figs. on 17 pls. & 44 coloured f.m. on pl. 1947. Pennsylvania State College [22s. 6d.]

This is a useful publication which hardly merits the title of a book. It consists mainly of a series of cyclostyled notes designed for the use of students taking a laboratory course in tropical medicine. Another useful purpose it can fulfil is to serve as a reference work for technicians or as a volume-meron for laboratory workers in the tropics. Commencing with amoebae these notes range through the familiar ground of flagellates, leishmaniae, trypanosomes, malaria parasites, coccidia and the whole range of helminthology. Medical arachnology and medical entomology are fully treated and in many instances keys to larval and adult characters are given. The last 40 pages are devoted to details of laboratory diagnosis and laboratory techniques. This section includes methods of faeces examination, preservation of specimens, concentration methods, mounting of entomological specimens, etc.

It is a matter for regret that the photographic reproductions of parasites and cells are so blurred and indistinct as in some cases to be almost undecipherable. This also applies to the legends, which are so much reduced as to be quite illegible. Reference is made especially to Plate VI where the reduction has been carried so far as to render the microfilariae unrecognizable even with a hand lens. The line drawings mainly devoted to entomology are quite distinct.

Appended there is a list of references, a glossary of generic and specific names of important human parasites and an adequate index. P. VANCEW-BLISH

REICHENOW, EDUARD. *Grundriss der Protozoologie für Ärzte und Tierärzte*. [Fundamentals of Protozoology for Medical and Veterinary Workers.] 2nd Edition. pp. vi + 99 77 figs. 1948. Leipzig Verlag von Johann Ambrosius Barth.

This is a second edition, somewhat enlarged, of the book which first appeared in 1943. The present edition appears to have been published under licence of the Soviet Military Authorities.

The conciseness and also compactness of the book give the impression that it was an *ad hoc* publication for the use of medical and veterinary officers during the 1939-45 war and, such, it would undoubtedly have been of great use.

The subject matter is probably arranged on the lines of the teaching at the Hamburg School of Tropical Medicine.

The first part of the book treats of the protozoa on general lines and calls for no special comment. The classification of the protozoa is given in a table and there is a smaller table enumerating the species parasitic in man.

The second part treats of the various divisions of the parasitic protozoa on conventional lines. The account is very complete within the severe limitations of space and the descriptions are clear and accurate as one would expect from so well-known an author.

The diagram of the life-cycle of the malaria parasite on page 64 shows a hypothetical exo-erythrocytic stage in the endothelial cells of blood capillaries, a guess now known to be incorrect.

Parasodium falciparum is given as a synonym of *P. intercalare*. This even if correct, only makes for confusion now that the former name is so universally used.

The book, as a whole, falls into the class of handbook, albeit a good one and can be recommended to anyone wishing a concise description of parasitic protozoa in German. H. F. SKIRRI

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES
BULLETIN

Vol. 46]

1949

[No 3

SUMMARY OF RECENT ABSTRACTS*

III MALARIA

Epidemiology

SHUTE (p 21) has contributed a note on indigenous malaria in Great Britain. DOELEMEN and VAN THIEL (p 670) refer to the epidemic of malaria at Middelburg, Holland, during the war, which was due largely to the fact that military horses kept in the town attracted the anophelines, which became infected on the gametocyte carriers normally present. In Germany malaria is now a serious problem in certain provinces, it has been introduced by returning soldiers and refugees and the lowered standards of health and nutrition have adversely affected the position. WEYER (p 1050) describes the situation, mentioning the vectors, which are races of *A. maculipennis*.

Writing of malaria in Czechoslovakia after the war, SNUPAREK (p 480) shows that the introduction of Rumanian and other troops from heavily infected areas spread the disease widely, and that wartime destruction created breeding places for the anophelines already present. *A. claviger*, *A. maculipennis maculipennis* and *A. m. messeae*. Epidemics of malaria have occurred since 1935 in the valleys of certain tributaries of the Danube in Rumania, and ZOTTA, *et al* (p 133) show that *P. vivax*, *P. falciparum* and (rarely) *P. malariae* were concerned. Man-made breeding places in river dams have encouraged the vectors, *A. maculipennis messeae*, *atroparvus* and (possibly) *maculipennis*.

The war had a disastrous effect on the malaria position in Italy, and CANAPERIA (p 229) shows that this was the result of destruction of bridges, dykes and drainage works, dispersal of staff, scarcity of drugs, over-population and the presence of non-immune troops. The increase in malaria occurred in the areas where the important vectors, *A. maculipennis labranchiae* and *A. sacharovi*, are found. Moreover, FERRARO (p 229) points out that as a result of war destruction, *A. sacharovi* has appeared in places in Italy where it was not previously found. Round Cassino, Italy, malaria spread widely as a result of wartime destruction, and GARACI (p 671) points out that up to 40 per cent of the infections were with *P. falciparum*, which was most common in autumn.

DE NEGRI (p 747) points out that the discovery of marsh gas at considerable depth, near Venice, has led to its exploitation for industry. One effect has been that from the bore holes there also emerges a large amount of saline water which has raised the salt content of neighbouring collections of water so that

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 v 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

they now encourage the breeding of *A. sackarovi* the most formidable vector in this area. MONACI (p. 747) also refers to the outbreaks of malaria which occurred in the neighbourhood of Venice from 1941 onward and reports that *A. sackarovi* was found where the endemic malaria was most severe. Increasing malaria to the north of Venice. PATRISI (p. 673) makes the point that *A. sackarovi* larvae have been found in canal water with a salt content as high as 72 per cent. The incidence of malaria was lowest where this mosquito was least abundant. BEADLE (p. 492) however found *A. sackarovi* breeding in water with very low saline content on the Venetian coast of Italy.

HÖRST (p. 28) describes an outbreak of malaria in German troops near Larissa in Greece most of the cases were due to *P. vivax*.

Late spring rains led to a severe outbreak of malaria in the Department of Algiers in 1948. *A. maculipennis* was abundant.

MATHEU (p. 22) gives a short account of malaria in part of Dahomey where spleen rates in children ranged up to 23 per cent. *P. falciparum* (the common parasite) SAUTET *et al.* (p. 856) draw attention to the frequency of *P. falciparum* in Mauritania.

DE AZEVEDO *et al.* (p. 968) report on a malaria survey of Portuguese Guinea, for details of which the original should be consulted.

SCHWETZ *et al.* (p. 230) as a result of an investigation undertaken along the eastern frontier of the Belgian Congo conclude that malaria does not spread there at altitudes over 1,700-1,800 metres and that the high plateaux are free. The chief vectors were not found at that height and though certain other anophelines were seen, they were evidently not important in transmission. SCHWETZ (p. 484) found high parasite rates round Lake Tumba in the Belgian Congo though the two mosquitoes *A. monoch* and *A. gambiae* were rare. SCHWETZ *et al.* (p. 748) note that *P. malariae* is very prevalent in both the Lubilash-Sankuru region and in the Katanga Province of the Belgian Congo although *P. vivax* is rare. They report on the anophelines found in these places.

HIRSCH (p. 671) records a survey of the people of Ta'eta Kenra where representatives of many tribes live. A high spleen rate and a low parasite rate in one place suggested that the common infection with *Schistosoma muriei* might be a cause of some of the cases of enlargement of the spleen. *P. falciparum* was the common parasite and *P. malariae* was also found, but not *P. vivax*. The vectors are *A. gambiae* and *A. foveolatus*.

At Kilimane in Portuguese East Africa the spleen rate varies from 58 to 77 per cent in children. *P. falciparum* (the common parasite) and *A. f. citri* and *A. gambiae* are the common vector. (RIBEIRO p. 231)

A malaria survey of Mauritius is reported by VERR and TAYLOR (p. 134). Malaria is largely confined to the coastal area. The average spleen rate in children living below 800 feet was 46 per cent and the rates were much less at higher altitudes. In one district the rate was 80 or more. Parasite rates are similar. The intensity of malaria is greatest in those parts where stunted malnutrition are most common and where infant mortality is highest. The vectors are *A. gambiae* and *A. f. citri* which are not very active in the old weather.

The New Hebrides have an evil reputation for malaria and MERRITT (p. 38) shows that it is the commonest disease and that it seriously affected United States troops during the war. *P. falciparum* is the common parasite, though *P. malariae* and *P. vivax* are also found. *A. punctulatus foveolatus* the abundant vector, it breeds in many kinds of water. Malaria not found further south (the Pacific than the New Hebrides). HURST *et al.* (p. 22) found spleen rates up to 84 per cent in children in part of New Guinea.

The incidence of malaria in the United States continues to fall though there are still hyperendemic areas in the south. FLETCHER (p. 231) *P. malariae*

infections are quite common in children (especially coloured children) in South Carolina (McDANIEL and HEMPHILL, p 856)

A malaria survey of Haiti is reported by PAUL and BELLERIVE (p 23), who found spleen rates of 29 in the lowlands, falling to 6 in the mountains. The highest rates were in children below the age of 4. The parasite rates were much higher, most of the infections being due to *P. falciparum*. *Anopheles albimanus* is ubiquitous, and *A. grabhami* is also common.

An epidemic of malaria in Venezuela (largely *P. vivax* in one town and *P. falciparum* in the country) is described by NIETO CAICEDO (p 24). The area concerned was the basin of Lake Maracaibo, and *A. albimanus* in the desert-like regions and *A. darlingi* in the jungle country were concerned in spread.

BATISTA (p 1051) has written a volume on malaria in Manaus, the capital of Amazonia, Brazil, where it is the chief endemic disease.

PIÑERO GARCIA (p 232) reports on malaria in Santa Fé, Argentina, where the common parasite is *P. vivax*.

Transmission

A discussion of species of *Anopheles* described in recent years is contributed by SENEVET (p 1051).

RAO (p 233) has shown that wingless mosquitoes have a strong tendency to walk towards dark places.

PEUS (p 26) in 1942 produced a German monograph on the anophelines of the Mediterranean region.

NOYAN (p 855) shows that in Turkey the common anophelines are *A. maculipennis*, *A. sacharovi* and *A. superpictus*, with *A. claviger* and *A. sergenti* in the south. He discusses the epidemiology of malaria in the various parts of the country.

KALANDADZE and KAVILADZE (p 296) report that in the western part of Iran Azerbaijan *A. maculipennis maculipennis* and *A. superpictus* are the most common vectors of malaria, *A. sacharovi* has a restricted distribution.

BUONOMINI and MARIANI (p 673) discuss the nomenclature of the *maculipennis* group. They distinguish 3 species—*A. maculipennis* (including race *messeae*, egg varieties *melanoon*, *fallax* and *subalpinus*, and biotype *cambournaci*), *A. labranchiae* (including race *atroparvus* and egg varieties *pergusae* and *sicaulli*), and *A. sacharovi*. They have erected a new group, *Maculipennia*, within the subgenus *Anopheles*, for these three species. UNGUREANU and SHUTE (p 136) have constructed a key for identification of the different varieties of *A. maculipennis* on the basis of wing scales. They consider that this group consists of at least four species rather than of varieties.

KETTLE and SELICK (p 571) show that the eggs of *A. maculipennis maculipennis* develop in 10 days at 10.6°C and in 4 days at 16.5°C, the eggs of *A. m. labranchiae* and *A. m. melanoon* take rather longer at these temperatures. VUILLET and LEVASSEUR (p 857) have exposed eggs of *A. maculipennis* to supersonic rays, and have noticed that the rate of development was accelerated. They discuss the phenomenon.

KETTLE (p 967) has studied the growth of the larva of *A. sergenti*, especially as regards the anal papillae in water of different degrees of salinity.

DE MEILLON (p 295) has published a comprehensive monograph on the anophelines of the Ethiopian Geographical Region, a most valuable work. MATTINGLY (p 137) has written on the early stages of certain Ethiopian anophelines, but his paper should be read in the original. SCHWETZ (p 296) has published a study of the mosquitoes (including anophelines) of the eastern part of the Belgian Congo.

In the Jebel Auiya reservoir, on the White Nile in the Sudan, LEWIS (p 968) found that *A. gambiae* is probably the main vector, but its breeding places are

well defined and can be treated with DDT in oil, or Paris green. *A. rufigris* is also probably a vector but breeds so widely that it is difficult to control. *A. pharoscensis* is very prevalent but not important and *A. / anisotarsis* found in the south where intensive house-spraying seems to be the feasible method of control.

Muirhead TROMSON (p. 482) has studied *A. gambiae* and *A. melas* in and around Lagos, and has tabulated the seasonal incidence. *A. melas* is found only within a mile of the shore and its abundance is determined mainly by tidal movements in the mangrove swamps. The abundance of *A. gambiae* on the other hand, is related to rainfall, since its breeding places are open shallow collections of water of many kinds. The sporozoite rate of *A. gambiae* is consistently higher than that of *A. melas* the former is relatively low when the mosquito is most plentiful, but may rise to 29 per cent. when breeding is least prolific. *A. gambiae* makes much use of houses for resting whereas *A. melas* rests more commonly outside these habits have an important bearing on the usefulness of residual insecticides. Both mosquitoes feed mainly after midnight, the period of greatest activity being between 4 a.m. and dawn. The breeding areas of *A. melas* are difficult to locate and the whole area covered with *Paspalum* is suspect but tidal swamp reclamation should eliminate all breeding.

WASSON *et al.* (p. 392) give an account of the bionomics of *A. mosquito* which breeds round the islands in the River Congo. It is a vector of malaria, and tends to rest on entering a house and then to feed and leave the house to digest the meal and mature the eggs outside.

FAIN and HEYWARD (p. 967) have recorded *A. mosquito* as the predominant anopheline of certain rivers in the Belgian Congo. *A. gambiae*, *A. / anisotarsis* and *A. / anisotarsis* were also found.

GILFARO (p. 137) has found *A. rufigris* naturally infected at Kano, Nigeria.

On the basis of precipitin tests Senior WHITE (p. 155) find that the anthropophilic index of certain Indian anophelines varies very greatly in different places, and according to whether they are caught in houses or cattle sheds. This may indicate the existence of biological races of these mosquitoes. RAO (p. 137) discusses the question of gonotrophic discordance in certain Indian anophelines: this refers to a state in which development of the ovaries does not keep pace with nutrition but is dependent on repeated feeding. It seems probable that mosquitoes in this state in which sexual activity is delayed are most likely to transmit malaria because they feed more frequently than more normal mosquitoes.

Senior WHITE (p. 571) has analysed a series of night catches of anophelines in Central India, where *A. / anisotarsis* is the known vector. *A. / anisotarsis* is found and is also probably a vector both when entered houses chiefly before midnight and before dawn.

GAYLER (p. 752) has made a survey of part of the Bengal Nagpur railway several species of anophelines were taken, including *A. / anisotarsis* infected specimens of which were found in the malaria season.

On the north coast of Madras the chief vectors are *A. / anisotarsis* and *A. / anisotarsis*. Salinity as low as 100 parts per 100,000 is the optimum for oviposition by *A. / anisotarsis* but half the larval production occurs in waters having 700-1,000 parts per 100,000. These and other findings by Senior WHITE *et al.* (p. 233) suggest two races of *A. / anisotarsis*.

The habit of the anophelines of Malaya were studied by NIX (p. 677) for details the original should be consulted. RIPP (p. 1057) has found two forms of *A. / anisotarsis* in Malaya one of which (dark wing) is found in the coastal plain and is a formidable vector the light wing form less important.

Epidemics of malaria occurred in Sarawak in 1944, which were due largely to intensive breeding of *A. / anisotarsis* partly because low rainfall enabled

brackish water to penetrate far up the rivers, and partly because spring tides flooded an area ravaged by war STRAHAN (p 749) states that although *A leucosphyrus* and *A umbrosus* may transmit along the coast, *A sundanicus* is responsible for the epidemic manifestations because it is so common

In a study of the anophelines used for transmission of malaria in connexion with the investigation of mepacrine in Australia during the war, MACKERRAS and ROBERTS (p 572) found *A punctulatus punctulatus* the most suitable It colonized readily and fed avidly on man, moreover, it is relatively long-lived, which, the authors think, is most important They detail the conditions which favour the mosquito, among which they mention freedom from disturbance WOODHILL (p 297) gives his reasons for thinking that there are two subspecies of *A punctulatus*, namely *A p punctulatus* and *A p farauti*, and that where these subspecies exist together there are hybrids between them *A kolensis*, which appears to be constant in its characters in the Solomon Islands, is not so in New Guinea, since it gives rise to both *punctulatus* and *farauti*, it also is probably a subspecies of *punctulatus* ROBERTS and O'SULLIVAN (p 968) have studied *A punctulatus punctulatus* and *A p farauti* in New Guinea, and show that the former is more anthropophilic than the latter After feeding, the females rest for a short time, and the application of DDT to the walls of houses is therefore a promising method of malaria control *A amictus lilli* in N Queensland shows habits similar to those of the *punctulatus* group

Quartan malaria is rare in the United States, and WELER *et al* (p 27) report a case in which infection was probably transmitted from a patient being treated with *P malariae*, by mosquitoes breeding near the hospital, to another man in the same hospital The need for screened wards under such circumstances is emphasized

YOUNG and BURGESS (p 1053) show that of 5 species of North American anophelines, *A maculipennis freeborni* was the most, and *A albanus* the least susceptible to strains of *P vivax* from certain other parts of the world In an examination of the infectivity of local strains of malaria parasites to *A quadrimaculatus*, YOUNG *et al* (p 674) in S Carolina found that even when the gametocyte density in the blood was extremely low the mosquitoes could become infected Patients without symptoms were as efficient as those with symptoms in infecting mosquitoes EYLES *et al* (p 1052) have allowed *A quadrimaculatus* to bite patients who have had *P vivax* malaria, at three periods—just before relapse, between attacks and at the end of attacks In each case some mosquitoes became infected Persons who have had this infection may be dangerous to the community in that they can infect mosquitoes even in the absence of clinical symptoms From their own investigations with *A quadrimaculatus* WEATHERSBEE and FROHNE (p 752) do not agree with the generally expressed opinion that the density of the vector is a major factor in the transmission of malaria They have found infected specimens when the density is exceedingly low They have also found gland-positive females in mule-stables, and they think that, for residual DDT to be effective, it should be applied to outside harbourages as well as to human dwellings

WILLIS (p 674) has investigated the olfactory responses of female *A quadrimaculatus*, if they have not had a blood meal they are attracted by the smell of the human arm, at 34°C and 70–85 per cent relative humidity VOGT (p 234) shows that the salinity tolerance of *A quadrimaculatus* larvae may be as high as 2,900 parts per million

Dispersal and feeding habits of *A freeborni* were studied by ROSENSTIEL (p 675) in California, who found that dispersal did not occur until July and was most active during September and October, up to 10 miles from the breeding places

The technique of rearing laboratory colonies of anophelines of the western United States is dealt with by HARDMAN (p. 298) for detail the original should be consulted. Similar papers have been contributed by BARRIS (p. 298) and GIGLIOLI (p. 299) these two authors discuss the rearing of *A. darlingi*.

FERNÁNDEZ MELÉNDEZ (p. 138) thinks that *A. scutellaris* may be an important vector in Cuba. It shows marked preference for human blood.

STACE and GILLITT (p. 577) note that in Trinidad *A. aquasalis* may travel 5 miles from its salt marsh breeding places. They discuss the breeding of *A. bellator* in the bromeliads of shade trees, and they have found that spraying these with 0.5 per cent copper sulphate kills the bromeliads. Plans have been made to use shade trees which are not parasitized by bromeliads.

GIGLIOLI (p. 483) has studied the house-frequenting habits of the mosquitoes of the British Guiana coast and shows that *A. darlingi* is the most common anopheline caught in dwellings. The domestic habits of this mosquito render the prospects of control by DDT residual house-spray excellent. FLOCH (p. 749) reports on malaria in French Guiana where *P. falciparum* is now more common than *P. vivax* (which was not the case in 1917) the common anopheline is *A. darlingi* but *A. aquasalis* and many other species are also found.

In Brazil as a whole PINOTTI (p. 237) states that 8 species of *Anopheles* have been found naturally infected. *A. darlingi* is the most important vector but *A. albipennis*, *A. tarsimaculatus* [*A. aquasalis*] and three species of *Heriodes* (breeding in bromeliads) are also important. The subgenus *Heriodes* in Brazil is discussed by PINOTTI *et al.* (p. 1053). CORTINHO (p. 969) describes the anophelines of Brazil, 6 species of which are vector — *A. darlingi*, *tarsimaculatus*, *cruxi*, *bellator*, *homunculus* and *albipennis*. In the Amazon region of Brazil, the chief vectors are *A. darlingi* and (in coastal areas) *A. aquasalis*. DEANE (p. 232) found that most infections were due to *P. vivax*.

PENIDO (p. 301) describes the malaria position in the region of the Rio Doce Brazil, where *A. darlingi*, *A. albipennis* and *A. aquasalis* are the chief vectors. The extent of the annual epidemics is determined by the extent of flooding from the river which overflows each year. At these times larval control is almost impossible but it is attempted during the dry season. Chief reliance is placed on Paris green and drainage but DDT will undoubtedly be used in future. *Anopheles darlingi* and *A. albipennis* are the chief vectors in the valley of the Rio Doce and *P. falciparum* was found by AMARAL and PENIDO (p. 77) in half of the positive blood slides seen in the area. In a description of the malaria history of part of Brazil SILVA (p. 673) shows that although several anophelines are indigenous only *A. albipennis* was taken in houses and found to be infected.

DE LUCENA (p. 676) has found *A. tarsimaculatus* breeding in water with a relatively high salt content (up to 33 gm. per litre) over 200 kilometres from the sea in Brazil. It is closely associated with outbreaks of malaria. *A. tarsimaculatus* is a name which has in the past included several species and varieties.]

CASTILLO (p. 740) mentions three malaria regions of Ecuador — the west coast, vector *A. albimanus* breeding seasonally, the inter Andes region, vector *A. pseudopunctipennis rivasdenisi* as the upper Amazon with its marshy vectors *A. (Heriodes) boliviensis* breeding in bromeliad and *A. darlingi* in marshes.

REY (p. 1053) gives an account of the known vectors of malaria in Cochabamba. Malaria shows seasonal prevalence in the Cafete Valley of Peru where the chief vector is *A. pseudopunctipennis* (ESTEL CASTILLO p. 570). The subgenus *A. pseudopunctipennis* is not yet defined. VILLALBA and VALDERAMA DEL PO (p. 300) have studied the habit of *A. pseudopunctipennis* in Peru.

Aetiology

A most important advance has been made in the understanding of the development of mammalian malaria parasites in the stage between injection of sporozoites and appearance of blood forms, by the work of SHORTT, GARNHAM and MALAMOS (p 388). These authors allowed large numbers of mosquitoes infected with *P cynomolgi* to feed on a monkey, and in addition they then ground up the mosquitoes in heparinized plasma and injected the suspension into the peritoneal cavity and into the muscles. Seven days later the pre-erythrocytic forms of the parasite were found within the parenchymatous cells of the liver. SHORTT, GARNHAM, COVELL and SHUTE (p 482) adopted a similar technique when they infected a human volunteer with very heavy doses of sporozoites of *P vivax*, both by the bites of large numbers of infective mosquitoes, and by the intravenous injection of an emulsion of infected salivary glands. The volunteer had, a long time before, been infected with *P vivax* but after this heavy inoculation liver biopsy revealed the pre-erythrocytic forms of *P vivax*, which were recognized in man for the first time. The details of the experiments which led to these important discoveries, and descriptions of the various stages of the parasites, are given in a later and more comprehensive paper by SHORTT and GARNHAM (p 762). The same authors (p 872) have shown that the exo erythrocytic schizonts of *P cynomolgi* may persist for 3½ months after sporozoite infection, and it is probable that this fact has a direct bearing on the occurrence of relapses.

HAWKING (p 388) reviewed some of his own material in the light of the findings of Shortt, Garnham and Malamos and confirmed their discovery. A more complete account of this work, with a description of the parasites is given by HAWKING *et al* (p 685).

YOELI (p 966) claims to have found non-pigmented malaria parasites (resembling *P vivax*) in bone marrow smears, together with leishmania.

BOYD and KITCHEN (p 393) have been able to show that in three strains of *P vivax* from the Pacific there were substantial immunological differences between one and the other two.

CIUCA *et al* (p 481) observed abnormal forms of sporozoites of *P vivax* and *P falciparum* in 17 and 32 per cent respectively, of *A maculipennis atroparvus* infected on gametocyte carriers in Rumania.

CHWATT (p 677) working in Lagos, shows that *P falciparum* invades mature and immature red cells indiscriminately and that *P malariae* is practically confined to mature cells. The degree of reticulocytosis varies according to parasite density. Persistent sub-clinical infections in African children are accompanied by increased erythropoiesis.

SHUTE and MARYON (p 751) have made a close study of a strain of *P falciparum* in a patient from the Belgian Congo. Details of its peculiarities should be sought in the original, but one notable point is that attempts to infect *A maculipennis atroparvus* in England failed.

SAUTET (p 670) thinks that spontaneous regression of malaria in any region may be the result of a limited capacity of the strain of parasite to produce gametocytes, and illustrates his views by reference to findings in Corsica and Russia.

MACDOUGALL (p 26) has detected chromosomes in the male gametes of *P vivax* and *P falciparum*.

MOSNA (p 136) describes a method for producing flagellation of microgametocytes *in vitro*.

SAUNDERS and SCOTT (p 135) have preserved *P vivax* in a viable condition for as long as 37 days by freezing infected citrated blood at -75°C and storing at -50°C .

BLACK (p. 25) has used a method of staining (which he describes) in his studies of the consumption of haemoglobin by malaria parasites.

Pathology

MACGRAITH *et al* (p. 234) refer to necrosis of the inner two-third of the hepatic lobules which they have observed in fatal malaria, and suggest that this is a result of anoxia due to reflex constriction of part of the hepatic venous system. CALEY (p. 301) discusses these findings and quotes his clinical experience in Siam, which suggested that there were hepatotoxic and encephalotaxic strains of *P. falciparum*.

Experimental work with carbon tetrachloride and other substances, undertaken to help in elucidating the pathogenesis of the centrilobular liver changes found in malaria, led ANDREWS and MACGRAITH (p. 678) to think that the necrosis is due to anoxia, possibly resulting from toxic swelling of the parenchymatous cells which constrict the blood channels. In an exposition of the pathological processes in malaria MACGRAITH (p. 1054) explains his conception of the part played by anoxia and circulatory disturbances. The latter may be due to reflex vascular mechanisms or to mechanical obstruction from swelling of endothelium or accumulation of cells, perhaps with local loss of fluid—the result is local tissue anoxia. The effects of these processes vary according to the vascular and tissue structure of the organ concerned and in the brain may lead to necrosis. The circulatory changes during a malaria paroxysm are probably of central origin, the vasomotor centres being probably stimulated by substances originating during parasitic sporulation. ANDREWS (p. 1054) shows that the liver changes in malaria (centrilobular degeneration) when they occur are the result of tissue anoxia and may be the result of reflex constriction of the smaller radicles of the hepatic vein. He discusses the mechanism of this constriction and the morbid histology of the liver.

LYNCH (p. 300) discusses the blood and bone marrow in the various stages of malaria.

Tests

NELSON (p. 30) found false positive serological test for syphilis in 3 per cent of 200 Europeans suffering from *P. falciparum* malaria in West Africa. These became negative shortly after treatment. CHAM (p. 31) also finds that false positive results are rare in malaria (less than 1 per cent in African, in the Congo) except perhaps in Europeans undergoing the first attack. MASON (p. 1046) has never found the Hecht reaction positive in malaria without syphilis, provided that the test has been properly carried out.

ZIFF (p. 1057) shows that the Tremar photometric modification of the Henry reaction is not suitable for rapid diagnosis of malaria, though it may have a value in diagnosis and prognosis if a series of test are performed.

DULACRY *et al* (p. 857) show that the complement titre of the serum is usually diminished in induced malaria and that it reflects the severity of the disease.

KLEBERG and BERNBAUM (p. 496) have studied liver damage in malaria by tests relating to serum proteins.

MAKARI (p. 344) has devised an intradermal test with antigen prepared from chicken blood infected with *P. gallinaceum* which gives a positive reaction in a high proportion of people who have had malaria and (weakly) in only a small proportion of non-malarial control persons. The test may be useful in masked or latent malaria. The same author (p. 395) has remarked that the incidence of positive tuberculin test is higher in patients with chronic malaria than in controls.

BROOKE and DONALDSON (p 1056) have shown that if slides are stained in bulk, blood may, under certain conditions, be transferred from one slide to another

ARU (p 970) gives details of a method of concentrating malaria parasites in blood, by haemolysis and centrifugation, for the purpose of diagnosis BERLINER *et al* (p 964) describe a centrifugation method of concentrating *P vivax* in blood, details should be sought in the original abstract

Clinical Findings

In a long and comprehensive article, FAIRLEY (p 20) describes the course of events in malaria induced by the bite of infected mosquitoes, as it was elucidated during the experiments made on volunteers in Australia during the war This study of parasitaemia in the untreated volunteers and in those treated with mepacrine and other drugs depended chiefly on the evidence obtained by subinoculation of blood The account should be read in the original

MELLINKOFF and HIGGINS (p 396) show that in malaria the pulse rate may range from tachycardia (as in many bacterial infections) to bradycardia (as in typhoid fever)

SOYSA (p 395) describes the clinical features of various forms of malaria seen in the military hospitals of Ceylon

In the Belgian Congo DUBOIS (p 235) has found a much higher splenic index in women than in men, though there is no evidence that women suffer more than men from malaria It is probably a question of relaxation of visceral ligaments in the erect position, and the author thinks that the splenic index in adults may therefore be misleading

Discussing the effect of malaria on pregnancy, KULCSAR (p 489) agrees that treatment should not be delayed if there is clinical suspicion of malaria, mepacrine is well tolerated

HERNBERG (p 236) shows that *P vivax* malaria is more benign in Finland than in more southern countries, he gives an account of the clinical course of the disease He (p 302) has found 4 instances of renal disturbance in 1,500 patients with benign tertian malaria in Finland [in the original abstract it was wrongly stated that they were cases of malignant tertian malaria] In all cases the symptoms were relieved by antimalaria treatment The same author (p 143) has seen transitory myocardial affection in 9 of 596 patients with benign tertian malaria

BENHAMOU *et al* (p 302) report a case of haemorrhagic meningitis associated with *P vivax* infection, the condition cleared under treatment with quinine

Neuropsychiatric symptoms occurred in the course of malaria in the Mediterranean during the war, and in some cases *P vivax* was incriminated, though most were due to *P falciparum* BOSHES (p 396) reports a case of meningoencephalitis due to *P vivax*

BOYD (p 138) reviews his experience with therapeutic *P vivax* malaria, in relation to the development of immunity Tolerance to the presence of parasites in the blood is the first sign of immunity, but later a strong destructive mechanism is developed, which does not seem to act on sporozoites but destroys trophozoites The completely refractory state may last a long time and there is no evidence that it depends upon a persisting latent infection, the immunity is not humoral

COOPER *et al* (p 140) have been able to infect by intravenous injection of trophozoites, patients who had previously been infected by mosquitoes with the homologous strain of *P vivax* but whose attacks had been suppressed by drugs, and who were in a latent period

WHORTON *et al* (p 235) discuss the immunity provoked by the Chesson strain of *P vivax*, giving details of the parasite densities at various stages

The incubation period of the Chesson strain of *P. vivax* in relation to the number of trophozoites or sporozoites infected, is discussed by WILKINSON *et al.* (p. 139). Some of the same workers (p. 139) have shown that when the incubation period was short the relapse rate was high and the latent period before relapse was short. The types of fever induced by this strain are described (p. 140) they are not exceptional.

As a result of a study of infection induced in patients with neurosyphilis by means of several Mediterranean and Pacific strains of *P. vivax* LOTIC *et al.* (p. 236) have noted differences between strains in incubation periods and average parasitaemia. They quote their observations in detail, and note that Negroes in the United States were refractory to these strains.

Discussing induced malaria for the treatment of general paralysis in Holland, BYLAKER and WIERCKEL (p. 487) make the point that a Dutch strain of *P. vivax* tended to have a long incubation period (6-9 months) and could not therefore be used. The Horton (Madagascar) strain does not show this feature but there is nevertheless, reciprocal immunity between these two strains.

BIANCO *et al.* (p. 28) discuss relapses in *P. vivax* malaria, admitting that there are unknown factors which determine these relapses. All effort made by the authors to precipitate relapses failed. In treatment mepracrine is better than quinine but the best results were obtained with plasmoquine-quinine. PURMAN *et al.* (p. 488) discuss the periodic phenomena of induced *P. vivax* infections: there seems to be a 12-day rhythm in parasitaemia and in recrudescences for which the authors cannot account. Details should be sought in the original. A study of relapses in American servicemen returned from the Pacific and the Mediterranean was undertaken by EYLES and LOTIC (p. 859) who show that in *P. vivax* infections parasites could usually be found some 3½ days before the febrile paroxysm of relapse and that the median threshold count was about 3,200 per cmm. Most relapses took place within 120 days (mean 81) of the preceding clinical attack, and most patients did not show parasites between attacks.

ROSS (p. 141) gives a long account of *P. falciparum* malaria as it is seen in Europeans in Kenya. On the whole he does not agree that its manifestations are very protean except in children. Treatment is very satisfactory with quinine or mepracrine and there is little tendency to relapse.

SCHNEIDER (p. 679) reports a case of haematemesis apparently due to *P. falciparum* malaria. BOXKE (p. 30) describes two cases of malaria in which there was severe haemorrhage from nose, stomach or bowel.

RATU (p. 838) describes a case of glycosuria in the course of malaria, caused, presumably, by an effect of the malaria infection on the islets of Langerhans. Treatment with paludrine cured the condition.

SPITLER (p. 840) reports a case of relapse of *P. malariae* infection 76 years after the original infection. BORD (p. 345) notes that in one patient a naturally induced *P. malariae* infection has lasted more than 11 years. ROGERS (p. 143) reports a case of transfusion malaria (quartan) arising from blood which had been stored for 3 days. The donor did not give a history of malaria but it was proved that his blood contained parasites. He had been a ship engineer in the East.

CHEN and WU (p. 143) report transfusion malaria in China, but not if the recipients were given quinine (1.2 gm. daily) for 5-7 days after receiving the blood.

Charles H. Cook

[To be continued]

MALARIA

ERIKSSON, T. Studien über die Malaria und *Anopheles* in Schweden und Finnland [Studies on Malaria and *Anopheles* in Sweden and Finland] *Acta Path et Microb Scandinavica* 1945 Suppl 59 88 pp., 31 figs [70 refs] [Summary taken from *Rev Applied Entom* Ser B 1948, Oct., v 36, Pt 10, 158]

In this detailed study of the history of malaria in Sweden and Finland, where it was widespread in the 19th century, the author discusses the factors that contributed to its appearance and spread in endemic and epidemic forms in those countries, and those that led to its virtual disappearance—the regression began soon after 1860 in Sweden, but not until well into the present century in Finland. The malaria centres in both countries at different periods are shown on maps, from which it appears that coastal towns were more seriously affected than rural districts. In Sweden, the disease occurred chiefly in the south-east, its distribution corresponded closely with that of its probable vector, *Anopheles maculipennis*, Mg., of which vars. *tyficus*, *nassiae* Flm., and *atroparvus*, van Thiel are present, but no correlation has been found between its transmission and any particular variety. In Finland the disease was limited mostly to the extreme south-western coastal areas although *A. maculipennis* also occurs much further to the north.

The spread of malaria in northern Europe in the 18th and 19th centuries is attributed mainly to the increase in trade and shipping. Since epidemics in Sweden and Finland often followed epidemics in central and southern Europe after intervals that increased with the distance northwards, it is concluded that the malaria was imported from these areas, and that the parasite concerned was probably *Plasmodium vivax*, which was the species responsible for isolated cases reported in Sweden in 1939.

The regression of malaria in Sweden and Finland is attributed mainly to the increased use of quinine and to a lesser extent to improved social and hygienic conditions, and not—as was suggested by Flensburg (1913), to the decline in summer temperatures that has been observed or to a decrease in the number of *Anophelinae*. The theory that the *Anopheline* vectors have changed to zoophilous habits is also rejected, since an epidemic occurred in Finland in 1920.

HENRIK, C. A. & TUOMITA, A. Incubation Time of Malaria Tertiana during an Epidemic in Finland in 1945. *Acta Med Scandinavica* 1948, v 130 Suppl 206 544 9 1 fig. 27 refs.

During the war malaria was of frequent occurrence in the Finnish army but in the home districts only sporadic cases occurred. In 1945 there were 1,252 cases of which only 85 were in the peace-time army. A more or less complete history was obtained in 868 cases. Of these 868 patients only 12 were women. There was no case below the age of 15 or above the age of 53—more than one-third of the patients were in the 20–25 age group. Summer temperatures in 1945 were unfavourable for malaria transmission anywhere north of Helsinki. But malaria cases were distributed widely throughout the country. By mid-April 112 cases had occurred; there are no mosquitoes in Finland at that time of the year. There were 440 cases in May and 352 in June; thereafter there was a constant decline in incidence. It is evident that the majority of the patients were not infected in 1945—infection by hibernating mosquitoes was a remnant of the previous year, as the districts in question had been free from malaria in the previous year.

Replies were received from 593 patients as to their whereabouts in the summer of 1944: nearly all of them had been on military service in the Carian theatre. Only 17 patients had been at home and only 5 on other fronts. Thus the majority of the patients had developed malaria after incubation period varying from 5 to 13 months.

The authors believe that increasing light determines increased virulence of the plasmodia. In this land of short summers autumn infections are especially likely to remain quiescent till the following spring.

Norman Wake

DILLBOYE P. Groupes ethniques et répartition des hématozoaires en zone d'hyperendémie palustre permanente de l'Indochine méridionale. [Ethnic Groups and Distribution of Plasmodia in a Hyperendemic Area of Southern Indo-China.] *Bull. Soc. Path. Exot.* 1943, 3: 41 Nos. 5 B, 258-61

— & CARTONNIER M. Groupes ethniques et répartition des hématozoaires en Indochine méridionale. [Ethnic Groups and Distribution of Plasmodia in Southern Indo-China.] *Ibid.*, 361-4 2 figs.

Populations from the healthier deltaic region of Tonking were transported to hyperendemic malarious region in the high plateaux of Southern Annam and in Cambodia. Conditions at the time precluded the use of prophylactic medication. Some years later the observations recorded in these papers were made. The very high degree of malaria infestation of the children of the Tonkingese immigrants did not differ significantly from that of the indigenous Moïs and Cambodian children, but there was a most remarkable difference in the prevalence of the species of *Plasmodium*. Among the indigenous children in Loth Annam and Cambodia *P. falciparum*, *P. vivax* and *P. malariae* were always found in that order of frequency, *P. falciparum* greatly preponderating. In the children of the immigrant population from Tonking *P. malariae* was always much more prevalent than *P. vivax* and in one instance more prevalent than *P. falciparum*. The indigenous and immigrant groups were living under exactly similar conditions and were exposed to attack by the same vectors. A *minimum* in most places, *P. pyrocephalus* in others. Further research is necessary to determine whether the relative resistance to *P. malariae* is a racial characteristic of the indigenous population acquired perhaps by prolonged exposure to infection by that species.

Norman Wake

DILLBOYE P. Contribution à l'étude de l'état de permanence antipalustre des peuplades Moïs du Sud Indochinois. Antimalarial Prevalence among the Moïs of South Indo-China. *Bull. Soc. Path. Exot.* 1943, 3: 41 Nos. 5 B 419-26. 12 refs.]

The resistance to malaria displayed by aboriginal Moïs in the intensely malarious high plateaux of south Indo China has been described by FAYE and PROBY and others (this Bulletin 1943, 37-39). The present author has recently carried out an examination of 633 children and 129 adults of four groups of these people.

The parasite index of the children was three times as great as that of adults. Though the parasite index of adults was high in some groups the number of parasites found in positive films was comparatively very low. The plevic index of children was two to three times as high as that of adults. Very large spleens were common among the children whereas the plevic rarely exceeded more than one or two finger breadths below the costal margin in adults. Gametocyte carriers are much less frequent among the adult. *P. malariae* infections decrease in frequency with advancing age but *P. vivax* infections

are relatively more frequent among adults than among children. In this respect the Moïs differ from the malaria-resistant races of Central Africa and elsewhere. *P. falciparum* is the most prevalent infection of both child and adult, mixed infections are extremely rare among adult Moïs, common among children. The acquisition of a state of premunition is costly to the Moïs, the infant mortality rate from malaria is extremely high.

Norman White

DELBOVE, P. *Plasmodium malariae* et prémunition antipalustre en Indochine méridionale [*P. malariae* and Antimalarial Premunition in Southern Indo-China] *Bull Soc Path Exot* 1948, v 41, Nos 5/6, 356-8

Annamites who were transported to hyperendemic malarial regions of southern Indo-China without any measures of malaria prophylaxis suffered much from *P. malariae* infection. In certain places this was the predominant type of malaria infection among them. Among the highly infected children of the indigenous populations of these same areas, *P. malariae* infections are relatively rare and always much less prevalent than *P. falciparum* and *P. vivax*. It would seem that the local Moï infant has an inherited resistance to *P. malariae*. It is interesting to note that in a study of congenital malaria in south Indo-China, *P. malariae* was more commonly found in the umbilical cord than either of the two other species of *Plasmodium*. This resistance to *P. malariae* increases with age. The examination of 2,142 individuals in four of the most unhealthy areas of south Indo-China gave the following results —

	Number examined	Parasite index	<i>P. vivax</i>	<i>P. malariae</i>	<i>P. falciparum</i>
Children	933	76.8 per cent	23 per cent	10.2 per cent	43.6 per cent
Adults	1,209	26.6 per cent	10 per cent	2.4 per cent	14.2 per cent

At least two factors enter into this process of immunization, an innate resistance to *P. malariae* and a state of premunition resulting from multiple and repeated malaria infections. In conditions such as these one can ignore the hypothetical intervention of a vector species specially adapted to the transmission of *P. malariae*.

Norman White

DELBOVE, P. Recherches sur l'état de prémunition antipalustre des collectivités annamites importées en zone hyperendémique de Cochinchine [*Antimalaria Premunition of Annamites transported to Hyperendemic Malarial Regions of Cochinchina*] *Bull Soc Path Exot* 1948, v 41, Nos 5/6, 427-33

Lack of prophylactic drugs was responsible for a greatly increased prevalence of malaria on most of the rubber plantations of Cochinchina. The observations here recorded were made on a particularly unhealthy plantation where the regular administration of quinacrine and premaline had ceased in December 1942. The labour force concerned had come from Tonkin. They were examined on four occasions between July 1943 and October 1944. The workers were divided into 3 groups according to their length of residence on the plantation at the time of the first examination: more than 5 years, from 2 to 5 years, from 1 to 2 years. The endemic malaria was particularly severe. The spleen index was lower in the first group than in the other two but was above 50 per cent on three of the four examinations. The parasite indexes showed less difference but the gametocyte index was markedly lower among workers of

more than 5 years' residence who had developed a manifest if slight resistance to malaria. Very large spleens were still common among this resistant group. The prevalence of *P. vivax* and *P. malarie* in the blood of the three groups was about the same. *P. falciparum* infections were less intense in workers who had been more than 5 years on the plantation but it remained the predominant parasite in all groups. During the observations *P. malarie* infections were on the increase while *P. vivax* infections decreased. Mixed infections were frequent among the new arrivals but were not seen among the group having 5 years' service.

Premunition in this part of Indo-China is difficult to acquire. Acquired resistance is ephemeral and never reaches the indifference to infection shown by adult aboriginal Moïs. Only extremely rigorous control and social measures succeeded in averting a catastrophe on the plantation in question.

Norman H. Hirst

DE MEIRA, M. T. V., SIMÕES, T. S. & NOGUEIRA, J. F. P. Observações sobre sazonalidade nas Ilhas do Sal, Boa Vista e S. Nicolau (Cabo Verde) (Malaria in the Islands of Sal, Boa Vista and S. Nicolau, Cape Verde Islands.) *A. Inst. Med. Trop. Lisbon*, 1947 Dec. v. 4, 13-38 [15 refs.] English summary.

The authors give the results of a malaria survey carried out in three of the Cape Verde Islands during November 1946 to January 1947.

Sal is the most northerly of the eastern sub-group of islands. It covers an area of 216 square kilometres and has a population of about 1,000, two-thirds of whom are half-castes. Most of the island is flat. Its climate is equable; the mean annual temperature is 24.7°C., the mean annual rainfall 129 mm. About half the population lives in the capital Santa Maria. Agriculture is almost non-existent; the rainfall is deficient and the soil poor. Conditions of life are precarious; dwellings are most unsatisfactory from a sanitary point of view; scarcity of fruit and fresh vegetables engenders vitamin deficiency. Infant mortality is excessive about 22 per cent of the total mortality; the chief cause being enteritis. During recent years malaria cases have numbered from 31 to 75.

Of 159 children between 7 and 14 years of age 14 had a palpable spleen. Only one of these children harboured malaria parasites *P. malarie*. Nine adult *Anopheles gambiae* were captured in one house; the larvae of this species were found in several places in a locality some 6 km. from Santa Maria. It was here that the patient with the positive blood smear lived.

Boa Vista forms part of the eastern sub-group of the archipelago. It (220 square kilometres) supports a population of 3,000; it is the third largest island of the group. Like the other islands it is of volcanic origin and has 11 hills varying in height from 700 to 337 metres. Two winding streams with low banks and irregular beds allow water to stagnate in places for many months after the rains.

Malaria cases are reported each year; a severe outbreak in 1943 caused 368 cases with 11 deaths. The authors examined 349 children from 1 to 14 years of age; 50 had palpable spleens (14.3 per cent). One of the children was infected with *P. malarie*. Search for adult and larval anophelines resulted in the capture of a single adult female *A. gambiae* in a dwelling house.

S. Nicolau is the most eastern of the northern sub-group of islands. It (343 square kilometres) has a population of 10,000. It has three mountains over 1,000 metres in height. There is considerable emigration of the population

in years of scarcity consequent upon deficient rainfall, and returning emigrants are frequently heavily infected with malaria. The total deaths from all causes over a nine-year period were 5,996, of these 61 were ascribed to malaria. Years of heavy malaria incidence have generally been marked by heavy rainfall and the return of infected emigrants from the isles of Santiago, S. Tomé, and from Angola, etc. The spleen index of 1,015 children aged 2 to 12, who had never left the island, was only 4.4 per cent. Blood examination of these children revealed no malaria parasites. One child suffering from an indigenous *P. vivax* infection was found during the survey. No adult anophelines were captured. Numerous larvae were found, these were all *A. pretoriensis*. [See also this *Bulletin*, 1948, 45, 1122, 1129.]

Norman White

HOCKING, K. S. & MACINNES, D. G. Notes on the Bionomics of *Anopheles gambiae* and *A. funestus* in East Africa. *Bull. Entom. Res.* 1948, Dec., v 39, Pt 3, 453-65, 5 figs. [10 refs.]

Short accounts are given of some investigations into the bionomics of *Anopheles gambiae* and *A. funestus* at Taveta in Kenya during November, 1944 to June, 1945.

Night collections of anophelines in huts and tents at intervals of three hours showed that out of nearly 5,000 female *A. gambiae*, more entered between 1 a.m. and 4 a.m. than at other times and that there was no entry peak at 6 a.m. as has been recorded at other places. Of about 400 female *A. funestus* the greater number entered the huts just before dawn and with this species there was evidence of an entry peak at about 6 a.m. Of 324 male anophelines, 320 were captured after 4 a.m.

Illustrations show the external abdominal appearance of anophelines in each of the five stages of ovarian development. Stage V females of both species were isolated at 25.5°C and a diagrammatic record was kept of the changes in their external appearance after oviposition and after feeding. It was found that the mean interval between egg layings for both species was 4½ days. In a hut occupied by two Africans, morning sprays and mosquito collections made at intervals of one, two and three days showed no significant difference between the sizes of the catches, and from this it is concluded that the mosquitoes did not spend more than twenty-four hours in the hut.

Anophelines were collected daily and later every fourth day from two huts. Females were grouped according to their external abdominal appearance, this indicated that they entered the huts in approximately equal numbers each night and that there were enough of each stage either outside or in other huts to maintain these numbers in the two experimental huts.

The daily collections were then continued in the two huts but as far as possible all mosquitoes in twenty-eight other huts were killed. The collections from the two huts then showed that the numbers of those in the later stages I and II were maintained, while the numbers of those in the later stages III, IV and V must have been resting in some of the other huts and not in the bush, and that those entering the experimental huts were either newly emerged or newly returned from egg laying.

To sum up, *A. gambiae* and *A. funestus* did not spend more than twenty-four hours in any one hut. They moved from hut to hut and females did not rest in the bush in the daytime unless they were just emerged or just before and just after laying eggs.

H. S. Leeson

MACAN T T Mosquitoes and Malaria in the Kabaw and Kale Valleys, Burma. *Bull. Entom. Res.* 1948, Aug., v 39 Pt 2 237-68 2 text figs. (1 map) & 2 figs. on pl. [10 refs.]

The Kabaw and Kale Valleys, latitude 23° to 25° N., lie to the east of the high mountain range separating the plains of India and Burma. They are from 4 to 10 miles wide and are bounded on the east by a range of hills that separates them from the valley of the Chindwin. The total length of the two valleys is some 250 miles—the middle 100 miles of this distance along the road from Tamu to Hakmoeyu were alone surveyed. Population is very scarce in the Kabaw Valley and clearings are few and small. In the Kale Valley the population is denser—the whole of the centre of the valley has been cleared—rice is the main crop grown. The valleys are about 500 feet above sea level. One of the chief land routes from India to Burma runs through the two valleys. The valleys drain through a gorge in the eastern side of the valley.

June to September inclusive is the rainy season—rainfall is light at other seasons. Temperature is fairly high throughout the year. The inhabitants live in Burmese-pattern dwellings raised on poles some 6 or 7 feet above the ground.

Before the war there was very scanty knowledge regarding malaria and mosquitoes in this area. In 1942 part of the Allied forces retreated through these valleys—the spleen rates of many of these villages were then determined. In 1944 the author was in charge of a party from a Malaria Field Laboratory and remained in the valley on and off until May 1945. Spleen rates show that the malaria risk is uniformly high throughout the valleys—only one village out of 23 examined had a spleen rate under 60 per cent. Malaria transmission takes place throughout the year and is intense from May to December inclusive.

Seventeen species of *Anopheles* were recorded. During the rains the common species were *A. minimus*, *A. leucosphyrus*, *A. philippinensis*, *A. pyreticus*, *A. annularis*, *A. bitarsus* and *A. negus*. *A. minimus* is only locally abundant at this season and *A. leucosphyrus* is confined to the forest. When the rain ceases *A. leucosphyrus* and *A. negus* become rapidly reduced in numbers—the prevalence of *A. philippinensis*, *A. pyreticus*, *A. annularis*, *A. bitarsus* and *A. barbirostris* which breed in larger bodies of stagnant water such as rice fields decreases more slowly. *A. minimus* and *A. maculatus* are the only common and widely distributed species in the dry season.

During the dry season, *A. minimus* is the only vector. *A. maculatus* does not appear to bite man. In September the sporozoite rate of *A. minimus* was only 0.31 per cent. the important vector in the rains season among 4 species operating in the forest appeared to be *A. leucosphyrus*—how important it is as a vector in peace-time is difficult to assess. *A. minimus* at times find day time shelter in the forest when this comes close to the village—night arches in houses are important in the study of the mosquito population.

Larvae identified as *A. pulli* & with the aid of standard Indian key invariably proved to be *A. philippinensis* on emery, etc.

(A summary does small justice to the large amount of detailed information contained in this report.)

Norman Macan

COVA-GARCIA, P. D. distribución geográfica y datos biológicos de *A. albopictus*, uno de los principales vectores de la malaria en Venezuela. *Distribución and Biología de A. albopictus* a Common Vector of Malaria in Venezuela. *Arch. Inst. Venezolano de Biol. Trop. y Parasit. Med.* 1945 Jan. 1 No. 1 73-83 1 map 13 refs. English summary

In Venezuela *A. albopictus* is distributed along the whole sea coast and the marshy edges of Lake Maracaibo. The paper contains notes on adult testing

places, it commonly rests in bedrooms. The larvae are found in waters of many types

P A Burton

BERTI, A L & MONTESINOS, M Cultivos de arroz en relación con la malaria el problema en Venezuela [Rice-Growing in connexion with Malaria the Problem in Venezuela] *Cuad verde Com ejecut 3a Conf interamer Agric* Caracas 1946, No 52, 33 pp, 5 figs, 2 folding maps & 4 folding graphs [10 refs] [Summary taken from *Rev Applied Entom* Ser B 1948, Oct, v 36, Pt 10, 175-6]

The history of the relation between rice cultivation and malaria is reviewed, and the relative importance of the introduction of large numbers of workers and of the various cultural methods in causing outbreaks of malaria in the neighbourhood of rice fields is discussed. In Venezuela, where rice cultivation is of considerable importance, *Anopheles albimanus*, Wied, and *A pseudo-punctipennis*, Theo, breed freely in the flooded fields. The former is one of the two chief vectors of malaria in the country and the latter is stated to be a suspected vector.

Two serious outbreaks of the disease due to Anopheline breeding in newly established rice fields recently occurred in the state of Aragua, at La Victoria in 1943 and at Cagua in 1944. The rice-fields at La Victoria were about 1½ miles from the town, but those at Cagua practically adjoined it. In both cases, continuous flooding was used, and the vector was *A albimanus*. Maps of both districts and graphs indicating the course of the epidemics are given, and the numbers of Anophelines taken in traps with animal bait are shown in tables and graphs. At La Victoria, the fields were first flooded in May-June, malaria broke out in the town in June and was at its height in December. No breeding places of *A albimanus* were found in the area other than in the rice-fields, the various traps set up showed that the adults could fly for rather more than 1½ miles from the fields and that control measures against the larva greatly diminished their numbers, particularly in the more distant traps. These measures consisted in the application to the water surface at intervals of six days of 3 per cent Paris green in ash or road dust, which did not injure the rice. These and other anti-malaria measures were adopted in 1944, and the number of cases was much reduced.

The fields at Cagua were sown at different times and harvested throughout the year but again the outbreak began in June, suggesting that if the crop were harvested before that month, the danger might be avoided. Other breeding places were present, but only 1 per cent of the larvae taken were found outside the rice-fields. As no Paris green was available, a mixture of sawdust and kerosene was used against the larvae, but did not give good results.

As a consequence of the outbreaks, legislation was passed prohibiting the cultivation of rice by artificial irrigation near towns except under permit from the Division of Malarology. Permits have been issued subject to the proper levelling and preparation of the land, the use of intermittent drainage (four days flooding and four days draining) and the application of larvicides. Land that cannot be drained dry in four days may not be used for growing rice. The economic aspects of rice cultivation and the costs of epidemics and of control measures are discussed.

GÓMEZ MARCANO, A Infección oocística natural de los anofelinos de Venezuela Estado actual de las investigaciones [Natural Oocyst Infection of Venezuelan Anophelines] *Archivos Venezolanos de Patol Trop y Parasit Méd* 1948, Jan v 1 No 1, 86-92. English summary

DOUGET G. Note préliminaire sur l'emploi du S.N. 7618 en milieu malarial hyperendémique [Preliminary Note on the Use of S.N. 7618 (Chloroquine) in a Hyperendemic Malarial Locality] Ann. Soc. Belg. de Méd. Trop. 1947 Dec. 31 + 27 No. 4 341-6.

These observations concern 50 school children 6 to 7 years of age in Leopoldville. Twenty five were each given a single dose of 0.125 gm. of S.N. 7618 (chloroquine) once a week. The remaining 25 children were untreated controls. When the experiment started on the 15th of March, the end of the rainy season, the parasite index of the treated children was 84 per cent. and of the control group 80 per cent. Eighty per cent. of the infections were *P. falciparum* the remainder *P. malariae* there was no *P. vivax*.

Six days after the first dose of chloroquine the blood of the treated children was completely free from schizonts. Gametocyte carriers, however, had increased from 8 to 13. Six weeks after the commencement of treatment the blood of the treated children was completely free from parasites and remained so during the period of observation. The parasite index of the control children varied from 84 to 98 per cent. There was no absence from school on account of fever among the treated children whose general condition and intellectual activity were noticeably better than those of the control children. There was no sign of drug intolerance.

In addition a group of 30 adult Europeans each took 0.25 gm. of chloroquine once a week for six months. An examination of their blood was made once a month: no malaria parasites were found.

Various Effects

NELSON, L. A. & FITCHER, O. C. Chloroquine (SN 7618) Pathologic Changes observed in Rats which for Two Years had been fed various Proportions of this Pathology 1948 Apr. 43 No. 4 434-62 7 figs.

ATCUTLEY J. A., YOUNT E. H., HOSTED J. R., PULLMAN T. N., ALVING A. S. & EISENBERGER Lillian. Reactions observed during Treatment with Pentagaquine, administered with Quinacrine (Atabrine), Metachlorquine (SN 11 437), and with Sulfadiazine. J. National Malaria Soc. 1948 June + 7 No. 118-24 4 figs. 11 refs.

It has been shown that pentagaquine monophosphate has less curative effect against *P. f.* infections when administered alone than when given concurrently with quinine this Bulletin 1948 45 845. Tests were carried out with several other antimalarial drugs to determine whether they are capable of reinforcing the action of pentagaquine in like manner. None displayed activity comparable with that of quinine. During the course of the trial certain toxic reactions were encountered. These form the subject matter of this paper.

All subjects received 60 mcm. of pentagaquine base (50 mcm. monophosphate) a day in six equal divided doses, for 14 days. In addition 5 patients with malaria each received 16.8 gm. of paludrine citrate in 14 days. The action of pentagaquine was not thereby increased. In 1 patient with malaria who received 5.63 gm. of chloroquine diphosphate in 14 days the toxicity of pentagaquine was not thereby increased.

Quinacrine was given concurrently with pentagaquine to 5 patients with malaria. The 4 patients who completed the treatment each received 5 gm. of quinacrine dihydrochloride in 14 days. A mild hemolytic anaemia occurred in the 5th patient. Haemoglobin fell from 15 gm. per 100 cc. to 8.3 gm. on 11

when given concurrently
fell from 20.1 to 22 cm.

SN-11,437 in 14 days. The fifth had received 2 gm when treatment was suspended. Before the onset of malaria this patient had a white blood count of 10,000 per cmm, polymorphonuclears 4,700. The total count fell to 3,700, polymorphonuclears 4,700. The total count fell to 3,700, polymorphonuclears 2,500, during clinical malaria. On the fourth day of drug administration polymorphonuclears numbered only 620 per cmm. At this point both drugs were discontinued and quinine was given to control malaria, a rapid return to normal counts followed. One other patient showed no unusual toxic symptoms during the 14-day course of treatment but later developed agranulocytosis. Seven days after discontinuance of drugs the white blood count was only 1,700, no polymorphonuclears were found. Energetic treatment for two weeks was necessary before the number of granulocytes reached normal levels.

Four volunteers without malaria were given sulphadiazine (5 gm the first day and 4 gm daily thereafter) concurrently with the two-week course of pentaquine and quinine. One of them developed agranulocytosis.

The concurrent administration of either paludrine or quinacrine caused a marked increase of pentaquine plasma concentrations. SN-11,437 caused a marked and sulphadiazine a moderate decrease of pentaquine plasma concentrations.

Quinacrine may increase the toxicity of pentaquine. Sulphadiazine therapy is potentially dangerous during the administration of pentaquine.

Norman White

THIODET, J & FOURRIER, A. L'accès palustre, considéré comme un choc, peut-il être traité par des injections intradermiques de CO₂-globulines de paludéen (médication antichoc) [The Malarial Paroxysm considered as a Shock Phenomenon, its Treatment by Intradermic Injections of CO₂-globulin of the Malaria Patient (Anti-Shock Treatment)] *Bull et Mém Soc Méd Hôpît de Paris* 1948, Nos 26/27, 928-30

In 1937 THIODET and RIBÈRE showed that in acute attacks of malaria the relationship of serum albumin to serum globulin underwent variations comparable to those observed in serum supersensitiveness and other anaphylactic conditions. They reported at the same time a case of malaria in which the attacks were characterized not by fever but by urticaria. In subjects sensitized by an injection of therapeutic serum, the intradermal injections of CO₂-globulin prepared from the subject's own serum produces a series of small shocks analogous to those obtained by Besredka's method of desensitization. These considerations led to the treatment of four cases of *P. vivax* malaria with intradermal injections of CO₂-globulin prepared from the patient's serum. The treatment resulted in the suppression of rigor and fever although *P. vivax* continued its normal cycle in the blood stream. All four patients improved in health and put on weight, there was also an increase in the red cell counts. If these results are confirmed, this method of treatment may prove of value in pernicious attacks of acute malaria.

Norman White

HOLZ S & GRANIER M. Antimalaricos sintéticos [Synthetic Antimalarials] *Archivos Venezolanos de Patol Trop y Parasit Méd* 1948 Jan v 1, No 1 181-224 [74 refs]

A detailed review

CURD F H S HENDRY J A KENNY, T S MURRAY A G & ROSE F L. Synthetic Antimalarials Part XXVIII. An Alternative Route to N¹-Aryl-N³-Alkylidiguanides. *J Chem Soc* 1948 Oct, 1630-36

CROWTHER, L. F. CURD F. H. S., RICHARDSON D. A. & ROSE F. J. Synthetic Antimalarials. Part XXIX. The Preparation of some N^4 -Aryl- N^2 -alkyl- N^1 -allyl- and -dialkyl-diguanides. *J. Chem. Soc.* 1949, Oct., 1634-43.

BIRTWELL, S. CURD F. H. S. HENDRY J. A. & ROSE, F. J. Synthetic Antimalarials. Part XXX. Some N^4 -Aryl- N^2 - N^1 -Di-alkyldiguanides and Observations on the Conversion of Guanyldiureas into Diguanides. *J. Chem. Soc.* 1949 (Oct., 1643-57).

MALLIK K. L. B. Preventive Value of Paludrine in Malaria. *Indian Med. Gaz.* 1948, June v. 83 No. 6 271-2.

The residential area occupied by the Indian staff of the Ludlow Jute Mill in the Howrah District, contains eight families and a bachelors' mess and there amount to 47 adults and 39 children. The environment is highly malarious and during 1946 there were 65 malarial attacks—only two families escaped and 28 attacks occurred among the members of the bachelors' mess and its servants [from the context it appears that "attacks" is intended to imply individual cases]. Until the middle of 1947 quinine and quinacrine (mepacrine) were used for treatment and prophylaxis—the patients were not always regular in taking the drugs presented and relapses resulted.

In the second half of 1947 paludrine was introduced and a strict régime of prophylaxis was used. Adults and children over 10 were given 0.1 gm. twice a week and younger children had 0.05 gm. twice a week.

Those persons who had had fever within a month (mostly children) were initially treated with 0.3 gm. daily for 3 days although they had no fever at the time.

In 1947 there was no case of malaria among the families and the only 7 cases recorded occurred in the bachelors' mess. This latter finding is attributed to the fact that the members of the mess had neglected to take the second dose when they went home at week-ends. As the number of attacks in this group of 88 people was reduced from 65 in 1946 to 7 in 1947 and the latter cases are all believed to have been due to inadequate co-operation by the persons concerned, the author considers that the result of this small series substantiate the claim of paludrine as a causal prophylactic. The fact that paludrine was only introduced in the second half of the year must be taken into account in comparing the attacks during the whole of 1946 and the whole of 1947.]

H. J. O'D. Berk (author).

DARCY T. M. W. Malaria and the Army. *J. Roy. Army Med. Corp.* 1948, July v. 91 No. 1 722-28. 27 rel.

This paper consists of a statement of the policy to be adopted in the control of malaria in the Army. As such it is doubly authentic and sets out a considered policy which is concerned with malaria survey, destruction of adult mosquitoes, prevention of breeding, the use of prophylactic drugs, method of personal protection and the siting of camps. It also outlines the method of training, and the responsibilities of particular individuals in the campaign such as Regimental Medical Officers and Hygiene Officers.

It is no reflection on the author who has also set out the facts to say that the picture is disappointing and does not reflect the enormous change which has taken place in malaria control in the last three years. The use of insecticides and those apparently only immediate ones is restricted to very minor place in the control of small outbreaks of malaria in which the cases are small, anything more serious calling for malaria survey and anti-malarial measures relying largely

on oil and paris green This is admittedly to be reinforced by an adult spraying campaign, but as it is apparently to be applied weekly it is not clear whether immediate or residual insecticides are to be used, or proper value gained from them Mepacrine is advised as a prophylactic drug and it is thought that it is still too early to form a definite opinion on the value of paludrine

The author rightly points to the disappearance of the wartime specialist malaria control service, though he over-estimates the extent of the disappearance, and pleads for the maintenance of framework on which expansion could occur in war

G Macdonald

SCHULTZ, K H Malaria Control carried out by UNRRA *Pub Health* Johannesburg 1948, June, v 12, No 6, 173-83, 3 graphs & 6 figs

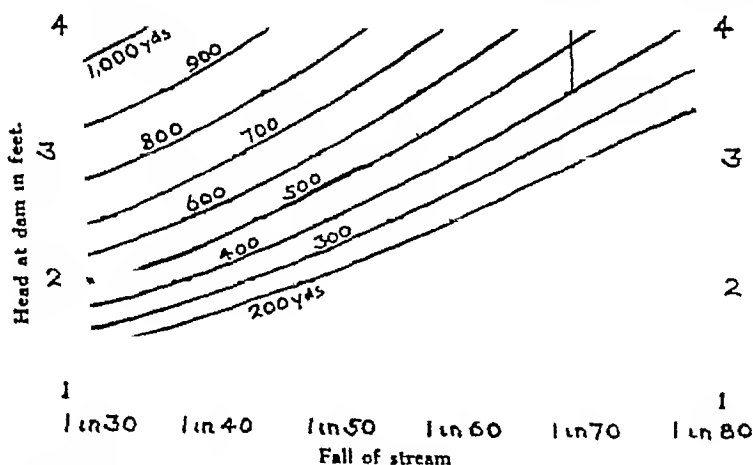
This paper refers exclusively to work in Italy It consists of an account of the increase of malaria following war, and an historical account of control schemes organized to combat it. The organization and methods are described and illustrated, and there are some good histograms and graphs showing the success of work in different areas

G Macdonald

PETTMAN, W E C Flushing Streams as an Antimalaria Measure under Field Service Conditions. *Indian J Malariology* 1947, Dec, v 1, No 4, 395-412, 13 figs

This paper is of real interest as it represents the hydraulic engineer's approach to the efficacy of flushing, not to the mechanics of siphons or sluices but to the relation between head of water, fall of stream and length of effective control The subject has been previously studied by WORTH & SULBRAHMANYAM [this *Bulletin*, 1941, v 38, 232], but deserves more enquiry

The author in Assam worked with simple dams and sluices, built in streams suited as breeding places for *Anopheles minimus*, and studied the shape and velocity of the wave at different distances from its origin He related these to the larvicidal effect of a single wave of known size and velocity, all



Showing effective range or distance below dam within which 95 per cent of larvae are killed for dams up to 4 ft high in streams whose fall is between 1 in 30 and 1 in 80

[Reproduced from the *Indian Journal of Malariology*]

three factors being obtained by direct measurement, and to the entomologist's assessment that a 95 per cent. kill by each individual was a produced perfect control. In consequence he was able to work out on engineering principles and direct confirmation by observation an effective range for flushes of different characters in different stream. The essential conclusions are epitomized in the figure here reproduced.

This figure omits reference to the effect of roughness of the stream bed, partly owing to the difficulty of measuring it and partly because it is a small factor that usually it makes no great difference in the type of stream considered. Observation of individual streams is however necessary to check that they are not grossly abnormal, before the formula can be applied.

The author rightly stresses that his observations apply only to breeding conditions for *A. minimus* in A. sam. They do however supply a rational approach of value to workers with this method in all countries.

G. Macdonald

HENDERSON J. M. The Eradication of *Anopheles albimanus* in Puerto Rico—
an Ecologic Discussion. *Mosquito News*, 1948 June & Sept. 8 Nos 2
& 3 45-9 87-101 [Refs. in footnotes.]

The author considers the tactics which should be adopted in a proposed effort to eradicate *Anopheles albimanus* from Porto Rico, an island of 354 square miles area of equable climate, with two million inhabitants and uniformly infested with this mosquito except on the mountainous central ridge.

The problem is both administrative and technological, only the latter aspect is discussed. The mosquito can be considered difficult to eradicate because its aquatic habit is very diverse including hoofmark and artificial containers. Its maximal flight range is great. It is more zoophilic than anthropophilic and never uses human habitations as daytime shelters commonly resting out-of-doors. On the other hand it does not hibernates there is no mechanism of prolonged survival of eggs away from water as in some species and it suffers a marked seasonal reduction from January to April which might facilitate eradication.

The mountain ridge in the island would make possible an attack on a relatively narrow front with the sea and mountains on the flanks so that in theory a progressive drive could be carried round the island though there would be difficulties due to the passage of transport through the area. A first operation. The author favours a main attack on larvae and on breeding places with a secondary attack on adults by means of residual insecticides. There are however so many unknown factors to estimate that it would be best to carry out a pilot scheme on a neighbouring smaller island of Vieques where precise data could be collected.

G. Macdonald

HART T. A. HART Jeanette H. & SARACHO-LOPEZ F. Malaria Control in
Guayaramerin, Bolivia. *Mosquito News*, 1949 Mar. 9 No. 1 1-5
7 figs.

Guayaramerin Bolivia, is an endemic malaria area with hot humid climate where the carrier has not been identified though six species of anophelins including *A. darlingi* are reported. Malaria control by application of par green to water and medication of the population with atabrine mepracrine has in the past had poor results. DDT in oil solution was applied to all houses in 1946 at an estimated dose of 1.43 gm. per sq. metre (5.8 oz. per 100 sq. ft.) and a second application of water soluble DDT at a dosage 1.43 gm. per sq. metre (5.8 oz. per 100 sq. ft.) was given later in the year. A similar

treatment was repeated in 1947. The results appear to have been excellent. In future, for reasons which are not quite clear, larvicidal treatment will be substituted.

The nature of the "water soluble DDT" is not defined. It does not appear from the context to be a suspension or emulsion. *G Macdonald*

KOISUMI, K & LIEN, Jih-Chung. Formosan Derris as an Anopheline Larvicide. *Chinese Rev Trop Med* 1948, Jan, v 1, No 1, 47-58

Derris is extensively cultivated in Formosa where it has been used for some time as an insecticide by agriculturists. During 1945, the authors investigated the value of derris as an anopheline larvicide using larvae of *Anopheles hyrcanus* var *sinensis*. As a diluent they used either powdered rice-straw or fine dry soil dust in various proportions.

To find the most suitable size of derris particle for use on water surfaces they screened the powders and grouped them into three grades: (a) large particles over 0.297 mm in diameter, (b) medium particles less than 0.297 mm, and (c) small particles less than 0.177 mm. Tests of these showed that in 72 hours the largest particle killed about 85 per cent of fourth stage larvae and only 44 per cent of first stage larvae. The medium particle killed 94 per cent fourth stage and 74 per cent first stage larvae. The smallest particle killed 56 per cent fourth stage and 100 per cent first stage larvae. It was decided that for field use the medium grade was the most satisfactory.

Experiments were then made with this grade of derris dust to determine the lowest quantity to apply to a given surface area of water. It was found that quantities between 0.05 and 0.3 gm derris dust per 3,300 sq cm of water surface gave kills ranging from 95 to 100 per cent in 72 hours. Field experiments subsequently showed that a rate of 0.2 gm derris per 3,300 sq cm of water surface was efficient.

A number of 24-hour experiments showed that toxicity to larvae was slightly greater at 18°C than at 14°C, that depth of water made little difference, that floating derris was more effective than the same quantity of powder stirred into the water and that soil dust as a diluent was satisfactory, and much less trouble than powdered rice-straw.

A warning is given that derris is toxic to fish, and that top minnows are killed if the proportion of powder to quantity of water is over 0.1 mgm per cent. *H S Leeson*

HAWKING, F & PERRY, W L M. Resistance to Proguanil (Paludrine) in a Mammalian Malaria Parasite (*Plasmodium cynomolgi*). *Lancet* 1948, Nov 27 850

Evidence has been given of acquired resistance by malarial parasites to plasmoquine (pamaquin), paludrine and quinine [this *Bulletin*, 1942, v 39, 438; 1943, v 40, 754; 1947, v 44, 969, 970; 1948, v 45, 158]. The present authors treated a baboon, infected by means of sporozoites of *P. cynomolgi*, with small doses of paludrine intramuscularly when the infection became patent. Partly as a result of drug treatment and the natural reactions of the host, parasites disappeared from the blood for considerable periods. Initially it was found that two daily doses of 0.03 mgm paludrine per kilo made the blood negative. After 14 months of repeated treatment with the small doses of the drug it was found in the case of the above animal that 23 to 30 mgm of paludrine, which approaches the maximum tolerated dosage, failed to free its blood of parasites. The acquired resistance thus appears to be very great. The infection in two other baboons and one rhesus monkey inoculated from the

rapidly depopulates at 6 per cent, the population is stationary and 3 per cent allows increase. The problem of increasing the numbers of cattle and pigs is still unsolved.

Sierra Leone.—The population is about 2½ million and there are probably less than 1,500 cases of sleeping sickness. epidemics have occurred near the French and Liberian borders but in 1943 the incidence there was about 1 per cent, and the epidemic is under control. observation is needed as the incidence is higher in the neighbouring countries. There are about 50,000–60,000 West African short-horn cattle which are believed to have a symptomless infection. improvement by selective breeding is therefore preferred to the introduction of outside breeds. About 8,000–8,000 are slaughtered annually. Tsetse flies occur almost everywhere and a large proportion are infected with animal trypanosomes.

The Gambia.—The area is about 4,000 square miles and the population about 250,000. No complete survey of sleeping sickness has been made but small surveys indicate an incidence of 1–8 per cent, some villages showing 25 per cent, or more. The co-operation of the French authorities is necessary to deal with the infection. The disease is mostly mild and chronic and spontaneous cures occur. Over-development of the groundnut industry is thought to have produced an increase of sleeping sickness owing to neglect of native food crops with malnutrition. cultivation of swamp rice in tsetse-infested areas is another factor.

There are about 70,000 West African short-horn cattle. symptomless trypanosomiasis exists but many cattle are thought to die of the disease.

The author concludes that trypanosomiasis is a fundamental barrier to progress in West Africa.

Species of trypanosomes.—The author believes that *T. panamense* is the only human trypanosome in West Africa, though atypical forms are found. see LESTER, this Bulletin 1934 v. 31 165. *T. rhodesi* and *T. congolense* are much commoner in cattle than *T. brucei*. In horses and donkeys the predominant species varies from place to place. *T. brucei* being commonest in some localities. camels have *T. brucei* only and it is the commonest species in pure tsetse fly epizootics of *T. simus* occur.

Diagnosis and Treatment.—A standard method of diagnosis (or at least of recording diagnosis) is needed. In Nigeria the Gold Coast and Sierra Leone a house-to-house census precedes mass diagnosis. gland palpation and puncture, blood examination, and lumbar puncture are used, the procedure varying according to circumstances. The author quotes interesting figures. in Nigeria (Bauchi province) gland juice alone 69 positive, gland juice and blood 4 blood alone 1. In the Gold Coast gland juice 129 blood alone 38. 1. were Leone gland examination mostly used but a census is not taken. in the Loma area, however, both gland juice and blood are examined. many symptomless cases occurred with trypanosomes in the blood only. Owing to staff shortage limited surveys only of animal trypanosomiasis in West Africa have been possible.

A standard treatment is desirable for unsupervised native staff. that commonly used in Nigeria, Sierra Leone and the Cameroons was three doses of Antrypol gm. 1 followed by five of trypanamide, gm. 2, at 5-day intervals. recently three doses of a mixture of Antrypol gm. 1 and trypanamide gm. 1 followed by two doses of trypanamide alone all at 5-day intervals has been used in Nigeria. it is shorter and seems to give better result. In the Gold Coast five doses of Antrypol gm. 1 are ordinarily given. late-stage patients may afterwards get ten doses of trypanamide gm. 1. or the course of trypanamide may be preceded by one dose only of Antrypol. Other courses and combinations have been tried. Pentamidine is thought to equal Antrypol in early cases.

Arsenophenylbutyric acid ("70 A") has given disappointing results in late cases in Nigeria and the Gold Coast

For cattle trypanosomiasis antimonyl sodium tartrate has been mostly used against *T vivax*, phenanthridinium chloride successfully against *T congolense* and *T vivax* and Antrypol against *T brucei*

Control—Mass survey and treatment has controlled sleeping sickness in all the British West African colonies and the incidence has been reduced below 2 per cent, but less is known about cure because patients are lost sight of, early cases are cured and late cases relapse. The French Sleeping Sickness Organization stated that mass treatment had eradicated the disease in the Cameroons and a similar result is claimed for a small area of the Belgian Congo near Lake Albert where the incidence was 10 per cent. The disadvantages in British colonies are that indefinite maintenance of sleeping sickness organization is necessary, the disease is not eradicated, and the problem of animal trypanosomiasis is unsolved

Special sleeping sickness dispensaries for treatment and local surveys are established in Nigeria, the Gold Coast and Sierra Leone, the staff are specially trained local inhabitants, in 1945 there were 40 dispensaries in Nigeria and staff were also posted to 19 Native Administration dispensaries, in the Gold Coast there are 9 sleeping sickness dispensaries but the dispensers do not travel, in Sierra Leone there are 6 sleeping sickness dispensaries and 5 rural treatment centres. In the Gambia there is no sleeping sickness service and patients are treated at the hospital and 6 Protectorate dispensaries

Prophylaxis by drugs—No conclusive results have been obtained in the colonies, in Nigeria Antrypol, gm 1 was tried but violent reactions and some deaths occurred, even with lower doses, and it was given up and pentamidine has been tried since, Antrypol was also tried in the Gambia without severe reactions, and in Sierra Leone Antrypol and tryparsamide, but the results are not yet known. A carefully controlled experiment with pentamidine was made in the Belgian Congo, a dose of 3 mgm per kgm being used, 721 people were protected for about 8 months. Unless the infection rate is high a large number must be treated prophylactically to obtain statistically significant results. In a laboratory experiment by van Hoof in the Belgian Congo three volunteers were protected for 6 months by a dose of pentamidine of 4.5 mgm per kgm. Van Hoof thinks that pentamidine is better than Antrypol as a prophylactic and that no cryptic infections follow its use

Defensive clearing—In the Gold Coast, Morris found that 500-800 yards of clearing along streams reduced *G palpalis* and *G tachinoides* by 60 per cent, $\frac{1}{2}$ mile by 80-95 per cent, 2-3 miles in the dry season and 5-7 miles in the rains gave 100 per cent reduction, 800-1,000 yards was the most efficient economically. If sufficiently large, as at Anchau in Nigeria clearing will eradicate tsetse fly in suitable areas, the cost is prohibitive in forest areas

Aggressive clearing—The aim is to extirpate the fly and it involves clearing all streams and rivers, it has been successfully done in the Anchau settlement in Nigeria and the Kumba valley in the Gold Coast. Cattle are also protected and since a cow needs 15 acres of grazing per annum in those countries, it is costly. A common policy of fly eradication is necessary in British and foreign West African territories

No practical results with DDT have yet been obtained

Organization of control in British West Africa—The Medical Department is in sole control of sleeping sickness measures in British West Africa and the Sudan, other Departments cooperate when needed. Formerly there was a Trypanosomiasis Committee of various Departments in the Northern Territories of the Gold Coast but it last met in 1937. In Nigeria a Developmental Committee of Divisions is proposed to coordinate the work of the various Departments

concerned. Coordination and development would be best obtained by a committee of Directors of Departments which would meet at least once a year the Governor would see that its decisions were carried out. An Inter-Colonial Sleeping Sickness Service has been proposed and the arguments for and against it are mentioned by the author who concludes that it is inadvisable, but a British Inter-Colonial Reclamation Service is desirable.

Anglo-Egyptian Sudan—Sleeping sickness in the northern Sudan is controlled by block clearings, concentration of people and treatment. In recent years there have been less than 100 cases a year and very few deaths. Mass surveys are made annually or more frequently patients are treated and report periodically and a pass system is used for visits to Uganda and the Belgian Congo. Antrypol is given prophylactically to such travellers and also to fly-boys and labourers exposed to tsetse flies. Clearings (800 x 20 yards) are made along streams and others around villages and watering places these have reduced fly movements by 75 per cent. Control measures cost £4000 per annum. No definite Sleeping Sickness Service exists.

French West Africa—The population in highly endemic centres is about 6 million, and 4½ million are surveyed annually. A special service of 4 European doctors, 38 *médicins auxiliaires* and 700 attendants makes these mass surveys with treatment and has full powers over the patients. They find a mixture of Moranyl (Antrypol) and trypanamide better than either drug alone in second-stage cases. pentamidine, 4-6 mgm. per kgm. is being tried intramuscularly and intrathecally. A case of apparently latent infection for over 4 years was seen by the author.

French Equatorial Africa—The figures of incidence are reliable only in the Brazzaville region (about 0.5 per cent.). A Special Sleeping Sickness Service lapsed during the recent World War and the present position of diagnosis and treatment is unsatisfactory but the incidence appears to be low (85-90 cases a year).

Belgian Congo—No special Sleeping Sickness Service exists. the disease is endemic in almost the whole of the western and southern parts. In 1940 the incidence in about 5 million examined was 0.4 per cent. The population is surveyed and treated twice a year. Aggressive clearing has not been done clearing being limited to watering places, fords and villages. Cattle are said to be in a state of premunition, the chief species of trypanosome being *T. uniformis*. There is an excellent laboratory at Leopoldville.

Liberia—The area is about 43,000 square miles and the population is thought to be between 800,000 (Dr. Bequaert) and 3½ million (Liberian Government). In the western areas in 1943-44 an incidence of 14.8 per cent. was found among 100,000 persons. In 1943-44 it was about 7.9 per cent. Mass treatment was given by the Firestone Plantation Company and the American Foundation of Tropical Medicine during these periods. In 1945 a United States Public Health Service Mission arrived to work for 5 years to care for the staff of certain public works. This Mission proposes to make a health survey which will include the endemic area of sleeping sickness. No information about keeping salivars in other areas of the territory exists.

J. F. Cawson

NASH, T. A. M. *Tsetse Flies in British West Africa*. 77 pp. 15 folding maps & 82 figs. on 18 pls. 1943 & 1945. London. Published for the Colonial Office by H.M. Stationery Office. 21/10s.

This report was prepared for the Tsetse Fly and Trypanosomiasis Committee appointed by the Secretary of State for the Colonies. The author who has recorded many years of work in Nigeria made a ten month tour of the British West African Colonies and investigated all a part of the life of tsetse

Trypanosomiasis

Vol 46, No 3]

flies in relation to trypanosomiasis in man and domestic animals he discussed the subject with various Departmental Officers concerned—Administrative Medical Veterinary, Agricultural, Forestry and others, with other European residents, and with African chiefs and leading men. Much has been written about tsetse flies and trypanosomiasis in West Africa and this Report gives the views of many workers in those countries and a list of 100 publications. The author toured Nigeria from July 15th to November 3rd, 1945, the Gambia from November 7th to December 13th, 1945, Sierra Leone from December 13th, 1945 to February 21st to May 13th, 1946, and the Gold Coast from February 21st to May 13th, 1946, and collected an immense amount of facts and information which he has considered under various heads such as climate, vegetation, agriculture and trypanosomiasis of man and animals. The history of tsetse research in the colonies, the various species of tsetse flies and their distribution and habits, and the methods of control or eradication are dealt with in detail, each colony being treated separately, and finally, British West Africa is considered as a whole and in relation to neighbouring foreign territories. The history of tsetse for future research are offered. The Report is illustrated with 16 plates of photographs and 15 coloured maps. The maps show the climate, vegetation, distribution of species of tsetse flies, incidence of sleeping sickness, density of population and cattle areas. It is much too detailed to be abstracted and only some figures and other matters of interest can be mentioned in this review.

Nigeria—Area 372,671 sq miles. Dimensions 600 x 600 miles. Population over 20 million, averaging 55 per sq mile. Tsetse flies extend from the coast to 12° N (or further, along big rivers) and infest 79 per cent of the country, the only free areas being the Bamienda highlands in the Cameroons, the Jos plateau, and the Anchau corridor. The chief endemic areas total 110,000 sq miles (30 per cent). Cattle cannot be kept in 104,000 sq miles (28 per cent) because of trypanosomiasis, but infected zebu cattle are kept in 77,000 sq miles (21 per cent) and uninfected zebu cattle are kept in 77,000 sq miles (21 per cent) of tsetse-free country in the north. It is interesting that cattle cannot be kept in the southern part of Nigeria where sleeping sickness is rare but can be kept in the north where sleeping sickness is common.

The species of tsetse fly are *Glossina palpalis*, *G. morsitans* and *G. longipalpis*. The first occupies 54 per cent of Nigeria, the second 50 per cent, the third 9 per cent, and the fourth so far as is known a much smaller area in the south west of the colony. *G. palpalis* and *G. morsitans* live near rivers and streams and can be controlled in many areas by bush clearing, but *G. longipalpis* has a wide range and the only effective method of control is to increase the density of the population which drives away the wild game on which the fly depends for its food.

Possibly one-third of the 5 million cattle are infected with trypanosomiasis. The present cattle tax yields £375,000 per annum and the Veterinary Department spends also (other £70,000) per annum. The author suggests that the labour (cattle people) should be settled in reserves and that clearings be made annually to extend the grazing areas. The importance of "mechanical" measures is also mentioned. The importance of "mechanical" measures is also mentioned.

The vegetation in Nigeria and in West Africa generally changes from the coast towards the interior. At the coast are creeks and lagoons, mangroves, and then the inland evergreen forest is found next comes the bushy woodland savannah, and then the dry woodland savannah. The author suggests that the labour (cattle people) should be settled in reserves and that clearings be made annually to extend the grazing areas. The importance of "mechanical" measures is also mentioned.

crossing and around villages and community clearings where the people are turned out to protect their own villages are explained in the Report, and method prescribed. At Rukuba, west of Jos a suitable plan of clearing streams flow from tsetse flies 20 sq. miles with a population of 7,000 at a cost of £273. The methods of exterminating tsetse flies in Nigeria vary with the species and locality for *G. palpalis* and *G. tachinoides* in savannah woodland, partial clearing of riverine vegetation, together with "ruthless" barrier clearing, is effective but in the forest no method of extermination is known. *G. morsitans* has never been exterminated in Nigeria but the best method would be to control settlements in the area and encourage ruthless hunting of game for which ex-soldiers might be employed. A preliminary experiment could however be made.

Suggestions for future entomological research include a study of the ecology of *G. palpalis* and *G. tachinoides* in southern Nigeria and of *G. longipalpis* and *G. caliginosa*. Field experiments with DDT, study of direct transmission by other biting flies, tsetse surveys, tsetse behaviour, transmissibility of trypanosomes by various species of tsetse flies, the effect of dense thickets near villages on *G. palpalis*, various experiments with partial clearing and game destruction.

Gold Coast—Area 91,840 sq. miles, dimensions 400 x 230 miles, population nearly 4 million averaging 43 per sq. mile but in the Northern Territories 10 to 25 per sq. mile. Tsetse flies are present throughout almost the whole country. The chief sleeping sickness areas comprise 31,500 sq. miles or 37 per cent. of the country. The four species of tsetse flies of economic importance are *G. palpalis*, *G. tachinoides*, *G. morsitans* and *G. longipalpis*. *G. morsitans* is present but little is known about it. A few specimens were caught on the northern edge of the forest. *G. palpalis* occupies about 71,000 sq. miles (77 per cent.), *G. tachinoides* 47,000 (52 per cent.), *G. morsitans* 1,000 (23 per cent.), the first two species cover between them practically the whole of the Gold Coast. The economic importance of tsetse flies cannot yet be estimated owing to lack of data.

No complete sleeping sickness survey has been made but the general incidence is low. Zebu cattle cannot be kept except in the Accra plain and the north-east corner of the Northern Territories. Zebu cattle for slaughter are driven from the French territory on the north southward through the Gold Coast and by the time they reach Kumasi (Kumasi) 60 per cent. are infected with trypanosomes. There are about 228,000 dwarf cattle in the Northern Territories, they are tolerant of trypanosomiasis but are susceptible to *riverpest* and ant *riverpest* vaccination lowers their resistance to trypanosomiasis. The Veterinary Department breeds zebu x dwarf cattle crosses while the Agricultural Department aims at improving the dwarf cattle by select breeding. It is interesting that zebu cattle cannot live in the Gold Coast but can live in similar country in northern Nigeria, the difference is probably due to heavy infection of *G. morsitans* from game owing to the sparser population in the Gold Coast. The author suggests that different breeds of cattle from all parts of West Africa should be collected at Kono and subjected to infection to find the most resistant breed which would produce manure meat and milk under exposure to tsetse flies and poor grazing conditions.

The Forestry Department and the Sleeping Sickness Service don't agree about the position of forestry reserves and plantation evergreen belts belt and wind-breaks. Protective clearings for river crossings and around villages have been made and two large agricultural clearing one at Lawra in the north-west corner of the colony the other at Pung Tarnale were made the latter was a great achievement. It was done at a place where annual flooding of the river occurs and it freed 600 sq. miles from tsetse flies except at the height of the flood. Nearly 160 miles of river were cleared and the river bank at

now bordered with grass and there is no erosion. Building low weirs or dams of earth and stone was very successful and supplied 14 villages and 3,000 cattle with water in the dry season. A drawback is that the pools cause an increase in guineaworm infection, the weirs cost from £50 to £150 each. Clearings of the Kamba river system at Lawra were "ruthless" and eradicated *G. palpalis* and *G. tachinoides* from 105 miles of stream and 600 sq miles of country, stumping has led to erosion in some parts, and regrowth of *Mimosa asperata* in the river bed has permitted the return of *G. tachinoides*. Consolidation of the position by settling population has proved difficult, but an agricultural demonstration farm which is being set up should encourage settlement. The annual entomological expenditure in the Gold Coast is rather over £5,000.

The author comments adversely on the meteorological work, it is unreliable and there is a lack of care and interest. He suggests that a civil meteorologist with a European staff be appointed (at present it is under the Air Ministry) and that a Livingston atmometer be supplied to every station.

Suggestions for further research include fly surveys of Togoland and the Seni and Afram plains, finding the northern line of *G. longipalpis*, tsetse distribution (in all the colonies) should be shown on maps by symbols of Fly-Boy-Hour catches, initials of collector, month and year, and a negative symbol, effect on *G. palpalis* of felling around mining camps and towns in the forest, observations with marked flies at places of personal man-fly contact such as water-holes, and also on cattle routes.

Sierra Leone—Area 27,000 sq miles, dimensions [160×160 miles?], it extends inland for 170 miles and the greatest north to south distance is 200 miles, population over 1½ million averaging 66 per sq mile. The western half of the colony is flat, the eastern half mountainous except the coastal area. *G. palpalis* and *G. longipalpis* are the only important species of tsetse fly and *G. palpalis* alone transmits sleeping sickness and most of the trypanosomiasis of domestic animals, it occurs very sparsely throughout the whole country while *G. longipalpis* is found only in the extreme north, covering intermittently about 1,700 sq miles or 6 per cent of the country. *G. fuscus* is said still to occur on the northern frontier. The rainfall is very heavy, ranging from 188 inches on the Freetown Peninsula to 89 inches at Kabala in the north, and it falls mostly in a few months.

The vegetation comprises mangrove swamps in the coastal area of creeks, primary evergreen forest, secondary evergreen forest, transition from secondary evergreen forest to grassland, and grassland and orchard bush. The mangrove swamps are probably feeding grounds only of *G. palpalis* breeding taking place in the fringing dry ground areas. Extensive rice cultivation in some places has replaced the mangroves and fringing breeding grounds with eradication of *G. palpalis*, it is the ideal economic way of eradicating the flies but the mangroves could be left to prevent erosion. Much of the primary evergreen forest has been destroyed by native farming and although tsetse flies have been exterminated by it, the author thinks that the man-made erosion is a greater menace, the mountains are bare and the plains devastated. Secondary evergreen vegetation is also being destroyed by farming followed by too brief fallow periods, the author suggests that it should be preserved as a barrier to the spread of tsetse flies and to keep up the soil fertility. The transitional zone consists of tall grasses with blocks of evergreen shrubbery. In the northern half of the territory are grassland and orchard bush which allow farming with short fallow periods. *G. palpalis* is here found along the streams as well as along the rivers.

There are two main sleeping sickness areas. (1) Sherbro Island and (2) south-eastern Konno. Luawa and Kissi, altogether about 2,800 sq miles or 10 per cent of the whole country. The incidence on Sherbro Island is very low,

crossing and around villages and community clearings where the people are turned out to protect their own villages are explained in the Report and methods prescribed. At Rakuba, west of Jos, a suitable plan of clearing streams freed from tsetse flies 20 sq miles with a population of 7 000 at a cost of £273. The methods of exterminating tsetse flies in Nigeria vary with the species and locality for *G. palpalis* and *G. tachinoides* in savannah woodland, partial clearing of riverine vegetation, together with "ruthless" barrier clearing is effective but in the forest no method of extermination is known. *G. morsitans* has never been exterminated in Nigeria but the best method would be to make controlled settlement in the area and encourage ruthless hunting of game for which ex-soldiers might be employed a preliminary experiment would however be made.

Suggestions for future entomological research include a study of the ecology of *G. palpalis* and *G. tachinoides* in southern Nigeria and of *C. longipalpis* and *G. californica* field experiments with DDT study of direct transmission by other biting flies, tsetse surveys, tsetse behaviour transmissibility of trypanosomes by various species of tsetse flies the effect of dense thicket near villages on *G. palpalis* various experiments with partial clearing and game destruction.

Gold Coast—Area 91,840 sq miles dimensions 400 x 230 miles population nearly 4 million averaging 43 per sq mile but in the Northern Territories 10 to 25 per sq mile. Tsetse flies are present throughout almost the whole country. The chief sleeping sickness areas comprise 34,500 sq miles or 37 per cent. of the country. The four species of tsetse flies of economic importance are *G. palpalis*, *G. tachinoides*, *G. morsitans* and *G. longipalpis*. *C. ugrofascia* is present but little is known about it a few specimens were caught on the northern edge of the forest. *G. palpalis* occupies about 71,000 sq miles (77 per cent.) *G. tachinoides* 47,000 (51 per cent.) *G. morsitans* 1 000 (2½ per cent.) the first two species cover between them practically the whole of the Gold Coast. The economic importance of tsetse flies cannot yet be estimated owing to lack of data.

No complete sleeping sickness survey has been made but the general incidence is low. Zebu cattle cannot be kept except in the Accra plain and the northern corner of the Northern Territories. Zebu cattle for slaughter are driven from the French territory on the north southward through the Gold Coast and by the time they reach Kumasi (Ashanti) 80 per cent. are infected with trypanosomes. There are about 228 000 dwarf cattle in the Northern Territories. They are tolerant of trypanosomiasis but are susceptible to rinderpest and under pest vaccination lowers their resistance to trypanosomiasis. The Veterinary Department breed zebu x dwarf cattle crosses while the Agricultural Department aims at improving the dwarf cattle by zebu breeding. It is interesting that zebu cattle cannot live in the Gold Coast but can live in similar country in northern Nigeria. The difference is probably due to the heavy infection of *G. morsitans* from game owing to the larger population in the Gold Coast. The author suggests that different breeds of cattle from all parts of West Africa should be collected at Vom and subjected to insecticide to find the most resistant breed which would produce manure more and milk under exposure to tsetse flies and poor grazing conditions.

The Forestry Department and the Sleeping Sickness Service should agree about the position of forestry reserves and plantation evergreen belt and wind-breaks. Protective clearings at river crossings and around villages have been made and two large areas cleared—one at Lawa in the north-west corner of the colony the other at Poni. Yamalo were made the latter was a great achievement as it was done in a place where annual flooding of the river occurs and it freed 600 sq miles from tsetse flies except at the lower bit of the flood—nearly 160 miles of river were cleared and the river bank.

now bordered with grass and there is no erosion. Building low weirs or dams of earth and stone was very successful and supplied 14 villages and 3,000 cattle with water in the dry season. A drawback is that the pools cause an increase in ginn worm infection, the weirs cost from £50 to £150 each. Clearings of the Kumba river system at Lawra were "ruthless" and eradicated *G. palpalis* and *G. tachinoides* from 105 miles of stream and 600 sq. miles of country, stumping has led to erosion in some parts and regrowth of *Mimosa asperata* in the river bed has permitted the return of *G. tachinoides*. Consolidation of the position by settling population has proved difficult, but an agricultural demonstration farm which is being set up should encourage settlement. The annual entomological expenditure in the Gold Coast is rather over £5,000.

The author comments adversely on the meteorological work—it is unreliable and there is a lack of care and interest. He suggests that a civil meteorologist with a European staff be appointed (at present it is under the Air Ministry) and that a Livingston atmometer be supplied to every station.

Suggestions for further research include: fly surveys of Togoland and the Sen and Mram plains; finding the northern line of *G. longipalpis* tsetse distribution (in all the colonies) should be shown on maps by symbols of fly, Box-Hour catch, initials of collector, month and year, and a negative symbol; effect on *G. palpalis* of felling around mining camps and towns in the forest; observations with marked flies at places of personal man-fly contact such as water-holes, and also on cattle routes.

Sierra Leone—Area 27,000 sq. miles (dimensions 160 x 160 miles?), it extends inland for 170 miles and the greatest north to south distance is 200 miles; population over 1½ million averaging 66 per sq. mile. The western half of the colony is flat, the eastern half mountainous except the coastal area. *G. palpalis* and *G. longipalpis* are the only important species of tsetse fly and *G. palpalis* alone transmits sleeping sickness and most of the trypanosomiasis of domestic animals. It occurs very sparsely throughout the whole country while *G. longipalpis* is found only in the extreme north covering intermittently about 1,700 sq. miles or 6 per cent of the country. *G. fusca* is said still to occur on the northern frontier. The rainfall is very heavy, ranging from 188 inches on the Freetown Peninsula to 87 inches at Khabala in the north, and it falls mostly in a few months.

mostly less than 2 per cent. The trading town of Bonthe is visited by infected Africans from the other sleeping sickness area. It is interesting that there have been 5 cases of sleeping sickness in Europeans in 4 years. They travel mostly by launch and may have been infected mechanically from the native crew. A other biting flies swarm at times in the creeks. Information on the incidence among the crews would be interesting. In the eastern area, bordering French Guinea and Liberia, incidence rates of up to 20 per cent were found in 1941 although tsetse flies were scarce. It was quickly controlled by mass treatment and in 1945 the incidence was less than 1 per cent. The author thinks that increased rice-growing from 1941 may have helped to reduce the incidence. In 1941, cases with few symptoms but with heavy blood infection were found [see this *Bulletin* 1948: 1: 45-410]. The author suggests that rapid mass prophylaxis at the beginning of the hot weather would reduce infection of flies from undiagnosed cases as the life of tsetse flies is shortest in the hot weather. Experimental clearing in the area should be done as a guide to the best kind of clearing to be undertaken. Clearing followed by rice cultivation might be both effective and economically valuable.

Trypanosomes kill horses and donkeys but few cattle. Infection of cattle in the northern areas, however, may be more fatal as in one part there were in 1942, only about 100 cattle in 800 sq. miles. Sierra Leone might become the greatest stock raising country in West Africa. *G. morsitans* is absent and *G. longipalpis* in a small area and unlikely to spread. Dry season grazing is good. Rinderpest is unknown and there is an enormous area of grassland. On the other hand, pleuropneumonia is present but could be combated by vaccination, contagious abortion is reported to exist and only certain tribes (4-6 per cent. of the population) keep cattle. In 1942 there were lost 45,000 cattle.

The policy of the Agricultural Department is to encourage swamp rice growing and discourage upland rice growing and this would allow longer fallow periods and lead to decrease in the numbers of tsetse flies. The Forestry Department wish to increase the forest reserves by cultivation of trees in the upland. Cash tree crops such as timber, cocoa, oil palm, citrus and rubber can be grown.

The author's suggestions for future entomological research include an inquiry into the effect of wet mud on pupae, the life history of tsetse and rates of infection, the influence of pig keeping and surveys of the distribution of *G. longipalpis*.

The Gambia—Area 4,130 sq. miles, dimensioned about 300 miles long by an average width of 6 miles. It extends along both banks of the River Gambi. It lies in north latitude 13° 30' which is about that of the northern boundary of Nigeria and has a similar climate and vegetation. Population 220,000, at a average density of 53 per sq. mile but if 1,000 sq. miles are omitted the density is 48 per sq. mile. Tsetse flies—*G. morsitans* and *G. longipalpis*—are both at present throughout the former confined to the sandstone plateau country and the latter to the river and creek and each species could be controlled separately. The author thinks that there are no ticks, although *Im. papillipes* may be present in the South Bank Province. Two oil palm forests near the mouth of the river also harbor *G. longipalpis*. The people must be warned from the tsetse-infested river banks and have excellent well cattle can be kept in all the provinces. *G. morsitans* is present throughout the north bank, but only on the south bank there are two reserves where it has not been found since the lower part 50 miles and the other for about 45 miles near the northern end. No entomological survey has been made since 1911.

Mangroves extend up the river for 160 miles then there is a swamp forest for 34 miles and finally 105 miles of river with light land in the dry season. Sea water penetrates up the river for 100 miles. The Niger is a tidal clearing technique would almost certainly succeed in eliminating *G. longipalpis* but attempt to eliminate *G. morsitans* by clearing would be wasteful.

much of the higher land is uncultivable so *G morsitans* could not be dealt with by increasing the density of the population. There are few antelopes and *G morsitans* probably feeds chiefly on baboons. The author distinguishes "close personal" and "close impersonal" contact between man and tsetse fly, the former occurs at village water-holes where the same people are repeatedly exposed to bites, the latter on the river (*G palpalis*) and roads (*G morsitans*) where exposure is more casual and the flies feed on many kinds of hosts. In the Gambia contact is impersonal as the people use wells except in the creeks.

There are about 70,000 cattle of two kinds, true West African shorthorn dwarf, and crosses of these with N'dama descendants of the Hamatic longhorn, both are very resistant to trypanosomiasis but not to rinderpest. A cross, with zebu cattle, is called Gobira and is more resistant to rinderpest. The common trypanosomes are *T congolense* and *T vivax*, *T brucei* being rare, calves often recover spontaneously. The cattle live exposed to *G morsitans* but if the flies feed mostly on baboons, they will not be heavily infected, in the Niuni area cattle do badly probably because there is more game there and the flies would be more heavily infected. Since the anti-rinderpest campaign began cattle have increased from 35,000 to 70,000.

The author's suggestions for future research include fly surveys of eastern Niuni and the high-banked reaches of the upper river, feeding of *G morsitans* on baboons, a sleeping sickness survey of the Gambia to determine the relative importance of the two species of tsetse fly and for plans to be made to deal with the worst areas.

West Africa—In a general summary the author has included on two maps of West Africa the latest data for the French and Portuguese colonies, he notes that the French map (*Carte de Repartition des Glossines et d'installation des Chantiers Prophylaxie Agronomique*, 1942) differs considerably from earlier maps and mentions the chief differences.

Where the West African coast line is at right-angles to the south-west monsoon (French Guinea to Liberia, west Gold Coast and Nigeria) the rainfall is heavy on the coast and decreases steadily inland until near the desert there are eight dry months and less than 30 inches of rain, but where the coast lies parallel with the south-west monsoon the dry conditions of the interior extend to the sea where however, the humidity is greater than in the interior. The length of the dry season increases on going northward along the Atlantic seaboard.

The author summarizes for West Africa the various aspects dealt with in the individual colonies. In his general conclusions he states that "the whole subject of man-fly contact needs investigation by a team of doctors, entomologists and statisticians" other conclusions are that study of the effect on tsetse of altering the plant succession should be made by large-scale field experiments and the effect on cattle of a certain amount of game destruction in an area without attempting tsetse eradication should be investigated.

J. F. Corson

NASH T. A. M. The Anchau Rural Development and Settlement Scheme
22 pp 10 figs (3 folding) & 16 figs on 4 pls 1948 London Published
for the Colonial Office by H. M. Stationery Office [3s 6d]

The Anchau Settlement is an area of 712 square miles in the form of a corridor 70 miles long by about 10 miles wide, situated in the eastern part of Zaria Province of Nigeria and extending in a south-easterly direction from the Kano-Zaria section of the main railway, it is traversed throughout its length by the River Galma and along its south-western side runs the Zaria-Jos railway, a few miles away but touching the corridor at two points. The corridor lies in

four Districts of Zaria Province—eastern Makarfi Ikara, Anchari, and Kofara from north-west to south-east. It was chosen as an area to be freed from tsetse flies and developed as a settlement.

The Settlement Scheme arose from the need to deal with a high incidence of sleeping sickness causing a serious mortality and the opportunity was taken to improve hygienic living and working conditions, and social amenities without attempting to alter the habit and daily life of the people. This area was chosen after much preliminary investigation, including a census of the people, entomological, vegetational and agricultural surveys, and estimates of the requirements and supplies of water, fuel and other needs.

The seriousness of sleeping sickness was observed in 1894 and in 1896 the author suggested the choice of the Anchari corridor as it had good communications and the eradication of the tsetse flies seemed to be possible. The Scheme was approved by the Secretary of State for the Colonies and a sum of £95,000 was granted from the Colonial Development Fund on condition that economic development should be an essential feature. It was to be spent in five years but the World War caused an extension to ten years. The work was carried out by the Sleeping Sickness Service directed by Dr H. M. O. Lester and the author was the senior entomologist on the Staff.

People living in adjacent areas were moved into the corridor to increase the population enough (to 70 per square mile) to maintain the bush-clearing by re-slashing along the streams. The only species of tsetse flies present were *Glossina palpalis* and *G. tachinoides* which keep near the streams and the bush-clearing was therefore less difficult than if *C. morsitans* had been present. High trees were not felled except at the end of the clearings where complete "ruthless" clearing for a mile of stream, as the crow flies, was necessary to prevent tsetse flies from re-entering during the rainy season. Details of this clearing are given in the author's paper *Tsetse Flies in British West Africa 1948* H.M.S.O. [above].

The preliminary work was begun in October 1937 and the building of new villages and hamlets began in 1939: the people built the huts they were used to but to a standard plan of blocks of compounds separated by fire-lanes around a central well which was 80 yards distant from the nearest pit latrine. Each compound was 100 feet square (or 100 × 50 feet) and contained on the average 7.5 persons: each block was separated from others by a fire-lane of 1.5 feet (diagrams of a village of 60 compounds and of a compound of 11 huts are given). Huts were 12 feet across and 12 feet from the nearest neighbouring hut. Pit latrines were made in the compound.

Wells of standard pattern were 4 feet across, cement lined and the mouth had a cement collar 2 feet high with a bevelled edge and a wooden roller to facilitate drawing: the water was poured from the bucket into cement basins from which it ran through pipes into the people's water casks. A special cement pump with a drain prevented too much mud from forming around the well. In September 1945 there were 128 standard wells in the corridor. Old sanitary wells were filled in or converted into pit latrines and public wells in the compound had a simple cement top fixed for which the owner paid 10/-.

Fuel—The average consumption of wood-fuel per head was 15 cwt (2 cords) per annum: on an acre of the local wooded country would supply 17 persons for year, so 12 acres would be needed for a 12-year cutting rotation.

Takalsiya ("walk in health") is the name of a new town built about 1 mile from the town of Anchari and into which some 1,000 of the inhabitants of the old town of Anchari were moved. It is the centre of local government and has a dispensary, school, mosque, court-house and prison. There is a new market with 14 stalls and a slaughter slab and a well, also an animal clinic, a clarified butter-fat unit and a hide-drying enclosure. The road is 160 feet

wide and are planted with avenues of mango, fig, and Cassia trees. The attendance on market-day was over 7,000.

Other improvements effected were hygienic improvements in the old town of Anchau and other small towns, issue of 18,500 fruit trees, introduction of new crops for trial, issue of ploughs and ploughing oxen, a rinderpest immunization camp, pig-keeping, breeding of horses and donkeys and of good strains of goats and poultry were encouraged. Communal forestry areas and forest reserves were established, elementary and village schools were set up, where reading in Hausa and the Mohammedan religion were taught.

Anti-tsetse stream-clearing—By April, 1945, tsetse flies had been eradicated from 610 square miles by clearing 540 linear miles of stream, and 50,000 people lived in fly-free country.

Costs—Huts, 21s each, wells, £40 each (37 feet deep), market stalls, £40 each, slaughter slab, £40, clearing (540 miles) £11 per mile for 450 miles, when wages were 4d per day.

Future prospects—The Native Authority needs training and could not yet take over the management of the area from the Europeans, without continuous supervision it would relapse, so the Sleeping Sickness Service should continue in control until a full-time District Officer can be appointed. The author makes useful suggestions for similar projects from the lessons learnt in this one, one being that an aeroplane should be used in surveying.

The Anchau Scheme has been the subject of previous papers [this *Bulletin*, 1939, v 36, 672, 736, 1942, v 39, 241, 1945, v 42, 788, 1946, v 43, 1022, 1947, v 44, 971], but this is the first detailed account of the work done during the eight years from 1937 to 1945 and it will be very useful as well as interesting to all who are engaged in combating trypanosomiasis not only in man but also in domestic animals, which is regarded by some as the more important disease. Excellent photographs, plans and maps illustrate the paper. J F Corson

BUXTON, P. A. *Trypanosomiasis in Eastern Africa, 1947*. 44 pp. 1948.
London. Published for the Colonial Office by H M Stationery Office
[3s.]

This comprehensive report to the Tsetse Fly and Trypanosomiasis Committee in London is based on the author's visits in 1945 and 1946 to nearly all the African countries where trypanosomiasis is transmitted by tsetse flies, he attended conferences, visited and had discussions with various workers and inspected many areas where control of trypanosomiasis and tsetse flies, and reclamation of land for settlement, farming and grazing, had been carried out. The subject is so large and has so many aspects that it was necessary to select the most important and less well-established matters with special reference to work now being carried on. The report is both appreciative and critical of past and present work and several important recommendations are made. The need for more intercourse between workers through conferences, committees, exchange of visits and other forms of communication and discussion is strongly emphasized [work on trypanosomiasis has been greatly hampered by two World Wars and a period of world-wide financial depression].

The author groups his observations under the following heads: Current Problems and Research, Methods of Reclamation from Tsetse, Results of Reclamation, Organization of Research and Reclamation, and concludes with a four-page Summary. The whole subject is dealt with in considerable detail under subheads but the author has naturally had to select the more interesting and important features and matters which have not been sufficiently

appreciated. Some of these are given here though necessarily in a compressed and somewhat disconnected form.

Entomological Problems and Research.—The Tsetse Committee should prepare a uniform map for Eastern Africa on a scale of 1/4 000 000 within the next two years. The nomenclature of plant associations and types of woods, vegetation needs revision and standardization. It would be useful to know whether advance of tsetse flies follows an increase in their number. It should be remembered that advances are more noticeable than retreats and that both have no doubt occurred. Referring to the cost of the work at Shinyanga (Tanganyika Territory) during the last 25 years, the author points out that reclamation of land is not the only benefit obtained—a great deal of knowledge of tsetse flies has been acquired which will be a valuable foundation for future work. More attention should be given by entomologists to the transmission of trypanosomes by tsetse flies. An important question is whether the association of tsetse flies with certain types of vegetation depends on their perception of climatic conditions or on the smell and appearance of the vegetation. A young scientist with special knowledge of insect behaviour should visit Africa to study the question for 3 years. Direct or mechanical transmission of trypanosomes by tsetse flies and other blood-sucking flies needs further study. The authorities of the British Museum (Natural History) should be asked to compile a monograph on the Tabanidae. The precipitin test is useful to determine on which animals tsetse flies feed, but standard sera should be prepared in a large serological institute in Europe to ensure accuracy. Nocturnal feeding by tsetse flies should be investigated by means of an infra-red projector and a lens. The physiology of digestion in tsetse flies needs further study. It is remarkable that usually only a small percentage of flies which have fed on blood containing trypanosomes become infected—the case of the mongli reed-bark which may infect at least 60 per cent. of surviving flies is an interesting exception, and this should be investigated as well as the influence of temperature on the speed of development of the trypanosomes in the fly.

Protocols Problems and Research.—Interesting work on the morphology of trypanosomes has again raised the question of sexual differentiation and multiplication of trypanosomes. The author thinks that recent work tends to emphasize the distinctness of *T. rhodesiensis* and *T. brucei*.

Problems and Research in Human Medicine.—The importance of human trypanosomiasis may be estimated to some extent by the incidence and mortality in Kenya, Uganda and Tanganyika Territory less than 1000 cases and about 300 deaths a year are noticed and about 100 cases with 10-20 deaths a year in Northern and Southern Rhodesia, Nyasaland and Namaland. These numbers are small though there is of course always the possibility of an epidemic occurring. An interesting fact in epidemiology is the existence of healthy human carriers of trypanosomes. Another subject that has been much discussed is the animal reservoir of human trypanosomes, especially the wild animal reservoir. The author notes that it has been recommended that a medical man should concentrate on the epidemiology of sleeping sickness and make suggestions regarding its survey of large areas and when work in a small selected area should be undertaken the latter being an area where mild Gambian sleeping sickness occurs and this should be observed for a long period without the use of curative drugs to see whether spontaneous recovery takes place (is there not some risk to life). The author thinks that persons exposed to special risk of infection should receive prophylactic injections of antitrypanin every 3 months. The reviewer would prefer the greater risk of getting an unmodulated infection to the lesser risk of getting a marked infection.

Problems and Research in Veterinary Medicine.—There are said to be about 14 million cattle and about 15 million people in the East African colonies. It

believe that this transformation has actually taken place in the past and may occasionally recur under exceptionally favourable conditions.

In the case of Chagas's disease the rôle of lower mammal as reservoir host is much clearer. American human trypanosomiasis is a typical zoonosis, i.e. primarily an infection of wild animal (such as armadillos) from which it

dogs, also acquire the infection and serve as reservoir hosts. The position in the United States is peculiar for human trypanosomiasis has not hitherto been recorded there though local wild rat and *Triatoma* bugs harbour *T. cruzi* which is infective to man under experimental conditions.

Dr J. T. EDWARDS drew attention to the peculiarities of the veterinary aspects of trypanosomiasis which were caused by trypanosomes belonging to three groups (*brucei*, *congolense* etc.) differing in their morphology, development and antigenic constitution, as well as in response to drug treatment. In the case of infection with *T. cruzi* there was a difference in the response of various species of domestic animals to therapeutic and preventive treatment especially with Naganol. While in horses only large doses of this drug were effective in the case of bovines smaller doses of simpler remedies produced the desired effect. Dogs and camels occupied an intermediate position with regard to response to chemotherapy.

Dr Edwards then turned to the inter-relationship of trypanosomes of the *brucei* group. Indirect proof of their close affinity is provided by the successful employment of antigens prepared from *T. brucei* and *T. cruzi* in the complement fixation test for Dourine. As regard the possible adaptation of *T. brucei* to man, a parallel is provided by *T. equiperdum*. This species is usually not transmissible to rats but some strains are infective and can be passed through a series of these animals in which the course of infection is indistinguishable from that caused by *T. brucei* and *T. cruzi*.

Brig J. S. H. BURN thought that the prospect of discovering a drug conferring protection against *T. congolense* infection was promising especially in view of the encouraging result obtained with phenanthrodimine. This view was supported by Dr E. M. LOURIE who also remarked that the interpretation of many epidemiological problems in trypanosomiasis suffer from a tendency to regard the characters of the trypanosomes as being fixed. Actually it was possible to enhance the virulence of *T. gambiense* to that of *T. brucei* by passage through sucking rats. It has also been shown that the virulence of *T. rhodesiense* for man is considerably reduced after prolonged passage through sheep. In the light of these facts it is possible that tsetse which at the beginning of this century produced an epidemic form of sleeping sickness in Uganda, has assumed their present benign form after many years in game animals.

Dr I. HAWKING noted that since bovine and human trypanosomiasis in Africa originated from wild game control of the disease depended upon control of the reservoir host which need not in all cases destroy wild game. However Dr P. L. LE ROUX cited examples in favour of destruction of game for the eradication of tsetse. He also drew attention to the possible influence on the epidemiology of trypanosomiasis of temperature which has a direct effect on the infection rate of tsetse flies. Actually in the Rhodesias and in Bechuanaland sleeping sickness is restricted to the hottest areas.

Dr L. A. H. ADE, in reply mentioned the example of *T. vivax* a tsetse-borne infection which has spread far outside Africa into countries where it is transmitted by Tabanid flies. He said that evidence of common antigen in trypanosomes of the *brucei* group has also been provided by an blood and referred to recent physiological researches suggesting that the metabolic

processes in various groups of trypanosomes may be correlated with differences in their response to chemotherapy. He also stated that the clinical manifestations due to *T. gambiense* and *T. rhodesiense* were not clearly demarcated.

C A Hoare

HEISCH, R B. Rhodesian Sleeping Sickness in Kenya Colony. *J Trop Med & Hyg* 1948, Nov, v 51, No 11, 225-7

Two cases of sleeping sickness, one African, one European, were observed in 1947 in the south-west corner of Kenya, near the Tanganyika border. The diagnosis was made on (a) the acute course of the disease and (b) the virulent nature of the infection in subinoculated white rats in whose blood posterior nuclear trypanosomes occurred to the extent of 2-10 per cent of the total organisms. Monkeys (*Cercopithecus aethiops*) were easily infected, also guinea-pigs which proved the most convenient animals for maintaining the strain. Baboons were completely refractory, and the serum of these animals was found to exert a protective action on rats suffering from the disease though failing to cure them completely.

The blood of 82 local Africans and of 4 antelopes was examined but no trypanosomes were found. One cow showed *T. vivax* in its blood. Approximately 500 locally caught *Glossina swynnertoni* were allowed to bite 8 rats. One of these rats subsequently developed a *T. congolense* infection while three showed polymorphic trypanosomes. The latter were inoculated into a human volunteer with negative results and the trypanosome was therefore presumed to be *T. brucei*.

Laboratory-bred *G. swynnertoni* and *G. palpalis* were fed on animals infected from the European case. 11.4 per cent of the former and 2.3 per cent of the latter species of fly became infected. The prevalent tsetse flies of the district were *G. swynnertoni*, *G. pallidipes*, *G. fuscipleuris* and *G. brevipalpis*. [The author observes that the only definite record of Rhodesian sleeping sickness in Kenya Colony was in 1942, when a few Africans were affected by an extension of an epidemic from Uganda.]

P C C Garnham

STRUGGER, S. Fluorescence Microscope Examination of Trypanosomes in Blood. *Canadian J Res Sect E Med Sci* 1948, Aug, v 26, No 4, 229-31, 1 pl

The author describes two fluorescence microscope methods for the detection of trypanosomes in scanty infections.

The author had previously demonstrated that acridinorange (3, 6-tetramethyldiaminoacridin) was a vital stain for protoplasm, and has now applied it for selective staining of living trypanosomes in the blood. A drop of blood is mixed with a drop of acridinorange solution (1 in 10,000 of 0.85 per cent NaCl) on a slide and examined under a coverslip with a blue light fluorescence microscope. The apparatus can be constructed as follows: the source of light is provided by a carbon-arc lamp with attached convex lens, producing a bundle of parallel rays, which are filtered by a cuvette (2.5 cm thick) filled with a solution of saturated copper oxide ammonia to allow only blue light to reach the plane mirror of the microscope. The latter is of the ordinary type but has an orange-coloured filter inserted over the ocular, in order to absorb blue light.

When a fresh blood preparation is examined under low power of the microscope, the red cells are almost invisible, but the leucocytes are vitally stained, their nuclei and cytoplasm having a strong green fluorescence enabling an accurate count of the leucocytes to be made. The trypanosomes exhibit a

believe that this transformation has actually taken place in the past and may occasionally recur under exceptionally favourable conditions.

In the case of Chagas's disease the rôle of lower mammals as reservoir hosts is much clearer. American human trypanosomiasis is a typical zoonosis, i.e. primarily an infection of wild animal (such as armadillos) from which the disease is occasionally spread to man by *Triatomid* bugs. It is introduced into human dwellings. Once established in a community the infection is transmitted to man by domesticated bugs. Furthermore domestic mammals like cat and dog also acquire the infection and serve as reservoir hosts. The position in the United States is peculiar for human trypanosomiasis has not hitherto been recorded there though local wild rat and *Triatomid* bugs harbour *T. cruzi* which is infective to man under experimental conditions.

Dr J. T. EDWARDS drew attention to the peculiarities of the veterinary aspects of trypanosomiasis which were caused by trypanosomes belonging to three groups (*brucei*, *congolensis* group) differing in their morphology, development and antigenic constitution, as well as in response to drug treatment. In the case of infections with *T. evansi* there was a difference in the response of various species of domestic animals to therapeutic and preventive treatment especially with Nagamol. While in horses only large doses of this drug were effective in the case of bovines smaller doses of simpler remedies produced the desired effect. Dogs and camels occupied an intermediate position with regard to response to chemotherapy.

Dr Edwards then turned to the inter-relationship of trypanosomes of the *brucei* group. Indirect proof of their close affinity is provided by the successful employment of antigens prepared from *T. brucei* and *T. evansi* in the complement fixation test for *Dourine*. As regards the possible adaptation of *T. brucei* to man a parallel is provided by *T. equiperdum*. This species is usually not transmissible to rats but some strains are infectious and can be passed through a series of these animals, in which the course of infection is indistinguishable from that caused by *T. brucei* and *T. evansi*.

Brig. J. S. K. BOND thought that the prospect of discovering a drug conferring protection against *T. congolensis* infection were promising especially in view of the encouraging results obtained with phenanthridinium. This view was supported by Dr E. M. LORRIS who also remarked that the interpretation of many epidemiological problems in trypanosomiasis suffers from a tendency to regard the characters of the trypanosomes as being fixed. Actually it was possible to enhance the virulence of *T. g. marseus* that of *T. brucei* by passage through suckling rat. It has also been shown that the virulence of *T. rhodesi* for man is considerably reduced after prolonged passages through sheep. In the light of these facts it is possible that strains which at the beginning of this century produced an epidemic form of sleeping sickness in Uganda, have assumed their present benign form after many generations in game animals.

Dr F. HAWKING noted that since bovine and human trypanosomiasis in Africa originated from wild game control of the disease depended upon control of the reservoir host which need not imply destruction of game. However Dr P. L. LE ROUX cited examples in favour of destruction of game for the eradication of tsetse. He also drew attention to the possible influence on the epidemiology of trypanosomiasis of temperature which has a direct effect on the infection rat of tsetse flies. Actually in the Rhodesia and in the highland sleeping sickness is restricted to the hottest areas.

Dr C. A. HOWE implicitly mentioned the vampire bat as a tsetse-borne infection which has spread far outside New World countries. Here it is transmitted by *Tabanus* flies. He said that whereas a serous antigen in trypanosomes of the *brucei* group has also been produced in Africa and referred to recent physiological researches suggesting that the metabolic

processes in various groups of trypanosomes may be correlated with differences in their response to chemotherapy. He also stated that the clinical manifestations due to *T gambiense* and *T rhodesiense* were not clearly demarcated.

C A Hoare

HEISCH, R. B. Rhodesian Sleeping Sickness in Kenya Colony. *J Trop Med & Hyg* 1948, Nov, v 51, No 11, 225-7

Two cases of sleeping sickness, one African, one European, were observed in 1947 in the south-west corner of Kenya, near the Tanganyika border. The diagnosis was made on (a) the acute course of the disease and (b) the virulent nature of the infection in subinoculated white rats in whose blood posterior nuclear trypanosomes occurred to the extent of 2-10 per cent of the total organisms. Monkeys (*Cercopithecus aethiops*) were easily infected, also guinea-pigs which proved the most convenient animals for maintaining the strain. Baboons were completely refractory, and the serum of these animals was found to exert a protective action on rats suffering from the disease though failing to cure them completely.

The blood of 82 local Africans and of 4 antelopes was examined but no trypanosomes were found. One cow showed *T vivax* in its blood. Approximately 500 locally caught *Glossina swynnertoni* were allowed to bite 8 rats. One of these rats subsequently developed a *T congolense* infection while three showed polymorphic trypanosomes. The latter were inoculated into a human volunteer with negative results and the trypanosome was therefore presumed to be *T brucei*.

Laboratory-bred *G swynnertoni* and *G palpalis* were fed on animals infected from the European case. 11.4 per cent of the former and 2.3 per cent of the latter species of fly became infected. The prevalent tsetse flies of the district were *G swynnertoni*, *G pallidipes*, *G fuscipleuris* and *G brevipalpis*. [The author observes that the only definite record of Rhodesian sleeping sickness in Kenya Colony was in 1942, when a few Africans were affected by an extension of an epidemic from Uganda.]

P C C Garnham

STRUGGER, S. Fluorescence Microscope Examination of Trypanosomes in Blood. *Canadian J Res Sect E Med Sci* 1948, Aug, v 26, No 4, 229-31, 1 pl

The author describes two fluorescence microscope methods for the detection of trypanosomes in scanty infections.

The author had previously demonstrated that acridinorange (3, 6-tetramethyldiaminoacridin) was a vital stain for protoplasm, and has now applied it for selective staining of living trypanosomes in the blood. A drop of blood is mixed with a drop of acridinorange solution (1 in 10,000 of 0.85 per cent NaCl) on a slide and examined under a coverslip with a blue light fluorescence microscope. The apparatus can be constructed as follows: the source of light is provided by a carbon-arc lamp with attached convex lens, producing a bundle of parallel rays, which are filtered by a cuvette (2.5 cm thick) filled with a solution of saturated copper oxide ammonia to allow only blue light to reach the plane mirror of the microscope. The latter is of the ordinary type but has an orange-coloured filter inserted over the ocular, in order to absorb blue light.

When a fresh blood preparation is examined under low power of the microscope, the red cells are almost invisible, but the leucocytes are vitally stained, their nuclei and cytoplasm having a strong green fluorescence enabling an accurate count of the leucocytes to be made. The trypanosomes exhibit a

November 1946	Treated group 3 cases diagnosed clinically and on cerebrospinal fluid changes (no trypanosomes seen in blood or gland) Control group 7 new cases (trypanosomes seen)
June 1947	Treated group 3 cases diagnosed clinically and on cerebrospinal fluid changes, with no trypanosomes seen in blood or gland and 1 in which trypanosomes were seen. Control group 3 new cases (trypanosomes seen).

In summary among 133 treated persons only 1 new case was found with trypanosomes by the end of the two-year period though there was strong evidence of a high incidence of cryptic infections. Among 419 control there were 23 new cases all with trypanosomes. A 15-month interval between injections is judged to be too long.

(6) The Kintswana area (population 3600) consisted of 23 villages. One of these was selected as the "geographical and endemic centre of the area and after full curative treatment of those recognized to be infected, the remaining inhabitants (705) were treated prophylactically. The other 22 villages served as controls. Prophylactic treatment consisted of only a single injection of propamidine. Progress of the investigation was as follows (Treated group again refers only to those treated prophylactically) —

August, 1945.	Treatment
January 1946.	Treated group no new cases. Control group 54 new cases (trypanosomes seen)
May 1946.	Treated group 183 persons lumbar punctured and 11 per cent. found to have increased cell-counts.
August, 1946.	Treated group no new cases. Control group 39 new cases (trypanosomes seen)
January 1947	Treated group no new cases. Control group 49 new cases (trypanosomes seen)

Here also there was striking evidence of the "sterilizing" effect on the blood and lymphatic system combined with strong indication of cryptic infections when lumbar puncture was performed. In the authors' opinion any alteration in the cerebrospinal fluid, in these two areas is attributable to keeping sickens since relapsing fever does not occur and syphilis is very rare.

[This is a valuable contribution representing field trials of the prophylactic properties of diamidines on a really impressive scale conducted under the auspices of the FORCANT (see this Bulletin, 1948, 45:816). It is also the first time that the complication of cryptic infection has been clearly illustrated in field prophylactic work with diamidines.

In discussion, V. H. HOF suggested that many of the people with cryptic infection might have become infected before rather than after the prophylactic treatment. FARE did not think that this could apply to a high proportion of these cases especially those in whom the cerebrospinal fluid was only slightly altered toward the end of the two-year period. V. H. HOF also thought that cell-counts without protein estimations of the cerebrospinal fluid are inadequate since certain (unnamed) observers in the Belgian Congo believe that a moderate increase in cells (up to 100 per cmm) without increased protein may occur in Africans who appear quite healthy or who may be suffering from trivial conditions such as a pruriginous dermatosis.

E. H. I. M.

CHOUZ AFKS F. Contribution à l'étude de l'action des ultrasons sur les hématies [Effect of Ultrasonic Waves on Red Blood Corpuscles]. *R Soc Biol.* 1948, Aug. 14th Nos. 15-16 1080-82 1112

The author describes observations on the effect of ultrasonic waves on red blood corpuscles using an ultrasonic generator with a frequency 18000 cycles per second and a power 11470 Watts per second. The test was made

with saline suspensions containing from 20,000 to 900,000 erythrocytes per cmm. The results were assessed by removing samples at regular intervals and counting the red cells in a haemocytometer, the number destroyed being expressed in percentage of the total number of erythrocytes present at the beginning of the experiment.

It was found that the speed with which the red cells were destroyed was inversely proportional to the concentration of the suspension and also depended on the power generated. Macroscopic haemolysis is produced when the concentration of red cells in the suspension is about 2,000-5,000 per cmm. It was impossible to follow the morphological changes in the erythrocytes, for they broke up suddenly, without any preliminary alterations. C. A. Hoare

SCHOENAERS, F. Contribution à l'étude de l'action des ultrasons sur les trypanosomes [Effect of Ultrasonic Waves on Trypanosomes] C. R. Soc. Biol. 1948, Aug., v. 142, Nos 15/16, 1082-4, 1 fig.

The author records observations on the effect of ultrasonic waves on trypanosomes (*T. equiperdum*, *T. evansi*, *T. brucei*, *T. gambiense*, and *T. rhodesiense*) suspended in saline, using a generator described in a previous paper [see above]. The response of the different species of trypanosomes was similar. The rate and degree of destruction of the flagellates depended upon the amount of energy emitted and upon the concentration of the trypanosomes in the suspension. For the same amount of energy the speed of destruction is inversely proportional to the concentration: thus a suspension of 14,000 trypanosomes per cmm. is lysed in 20 seconds, while 75 seconds are required to produce the same effect in a suspension of 48,000 trypanosomes. The different phases of disintegration of the flagellates can be followed under the microscope in Giemsa-stained films. However, the ultrasonic waves do not act upon all the trypanosomes to the same extent: for some individuals may remain morphologically intact, retaining their motility and virulence, longer than others. By inoculating mice with samples of the treated suspension taken at different intervals, infections were produced with a progressively prolonged duration until—after sufficient exposure to the ultrasonic waves—the mice survived. This phase indicates the destruction of all the trypanosomes in the suspension. C. A. Hoare

NYDEN, Shirley J. Changes in Ascorbic Acid Metabolism of the Rat during Infection with *Trypanosoma lippicum*. Proc. Soc. Exper. Biol. & Med. 1948, Nov., v. 69, No. 2, 206-10 [11 refs.]

Dehydroascorbic and total ascorbic acid were measured in the liver, spleen, adrenals, muscle, and plasma of rats infected with *T. lippicum* and the reduced ascorbic acid content of these tissues was calculated. The liver, spleen and adrenals showed significant decreases in reduced ascorbic acid content. The dehydroascorbic acid content of the muscle was increased slightly and both dehydroascorbic and reduced ascorbic acid of the plasma were increased two-fold.

TALLER, R. A. Indices de infección tripanosomica humana en el Uruguay. [Index of Infection by *Trypanosoma cruzi* in Uruguay] An. Facul. de Med. Montevideo 1948, v. 33, Nos 5, 6 & 7, 466-78, 4 figs. on 2 pls. Bibliography 1.

In the author's opinion the surest way of diagnosing *T. cruzi* infection is that of xenodiagnosis or, as he prefers to call it, xenohaemoculture, for it is cultivation of the blood of the subject in the intestine of an uninfected

Triatoma He describes his method of rearing *Triatoma infestans*, *T. marginata* and *Rhodnius prolixus* the first two obtained in Uruguay the last two from the Oswaldo Cruz Institute Rio de Janeiro. In the town of Rherra in 1946 among 284 tested by this method 20 (7.0 per cent.) were positive and in Tamboré and Valle-Edén in the Department of Tacuarembó there were respectively 139 and 60 tested and 1 (8.6 per cent.) and 3 (5 per cent.) positive. All those tested were under 14 years of age and chosen haphazard among those living in infested ranches. In a future paper the author proposes to give an account of the clinical condition and the electrocardiographic state of some of these subjects.

H. Harold Sosa

SPAIN D. M. MOLODUT \ & WARRAW L. J. Preparations of *Lysates* from Cultures of *T. cruzi* and their Effects on Normal and Tumor-bearing Mice. *Proc. Soc. Exper. Biol. & Med.* 1948, Oct. v. 69 No. 1 134-8.

LEISHMANIASIS

ALGERIA. Cas de leishmaniose avec une érythémie réactionnelle secondaire (A Case of Leishmaniasis with Secondary Erythema.) I. *Soc. Méd. de Méd. Trop.* 1947 Dec. 31 v. 7 No. 4 419-27

An Algerian male aged 59 years who had maintained good health all his life but had two small accidents the last one during the previous year involving severe bruising in the left flank at the level of the 14th rib, presented himself complaining of a dull pain in the left flank, anæmia and emaciation.

On examination he was noted to have a cyanotic tinge of the lips of his face and limbs with varicosities on the latter and his tongue was scarlet. He had gross splenomegaly reaching down to the level of his umbilicus moderate liver enlargement, a little fluid in the left pleural cavity and a temperature of 38°C. The blood count showed a polycythæmia (7 million / cmm.) 18,000 leucocytes with neutrophils—84 per cent monocytes 7 per cent., and myelocytes— per cent. There were albumin and bile salt and pigment in the urine. A little fluid was withdrawn from the chest. Sternal puncture showed 31 per cent of erythroblasts of which 10 per cent were megakaryoblasts. Leucopelliculation of the serum occurred on the addition of formalin, and free leishmanias were found in the peripheral blood but not in the serum or spleen puncture material. A blood culture for *N. meningitidis* showed no old bodies but no flagellates. A diagnosis of kala-azar was made and a course of antimony was begun on August 14th. On August 14th the pain in the left flank had disappeared. A total of 3.5 grammes of *antimony tartar* was given. On September 19th the blood count still showed a polycythæmia of 7 millions but the leucocytes had fallen to 6,000. On October 1st, the count was 6 million red cells and 7,900 leucocytes and next day it was noted that his condition had improved considerably the spleen was reduced to a hand's breadth below the costal margin and the weight 63 kilograms. By November 15th, the condition had relapsed the spleen had enlarged and the weight was down to 60 kilograms. From November 18th the patient was given daily intramuscular injections of *glucan*. On November 20th, a few leishmanias were found in epithelial cells in a nasal smear. The patient improved rapidly and by December 15th the blood count was normal. After 18 injections his weight had recovered to 63.9 kilograms and the spleen was reduced to half its former size. A nasal smear was negative and on January 25th 1948 the man returned to his homeland.

The author considered that this was primarily a case of kala azar in which there was a stimulation instead of a depression of the marrow, causing a secondary polycythaemia

[Surprising features of this case were the failure to find leishmaniae in the spleen and bone marrow when free forms were found in the blood and nasal smears, and the absence of flagellates in the N N N culture] *L E Napier*

MORTON, T C & COOKE, J N C **Splenectomy in Kala-Azar** *Lancet* 1948, Dec 11, 920-23, 2 figs [12 refs]

"Splenectomy has come to be regarded as entirely contra-indicated in the treatment of kala-azar", but the authors report three cases which suggest that it may be the only method of cure in drug-resistant cases

They review the literature on splenectomy from MAKKAS [*Kala Azar Bulletin*, 1912, March, 94] to SWEENEY *et al* [this *Bulletin*, 1946, v 43, 114], in this last case, splenectomy was performed successfully, but as the result of an error of diagnosis. The present authors report a similar case—An airman recently returned from India had a large palpable mass in the left hypochondrium, anaemia and leucopenia, and albumin and pus in his urine. A sternal puncture showed no leishmaniae. His spleen, weighing 3,111 grammes, was removed. Leishmaniae were demonstrated in the smears and sections. Pentostam up to a total of 14.2 grammes was given and a complete cure was effected.

In several further quotations from the literature the authors refer to 4 instances of splenectomy in drug-resistant cases [TIMPANO, this *Bulletin*, 1931, v 28, 157; ABRAMI *et al* *ibid*, 1932, v 29, 499; MARTIN *et al* *ibid*, 1936, v 33, 30; BURCHENAL *et al* *ibid*, 1948, v 45, 319], and then report two fresh cases. The first of these was a patient of Professor Witts. He had had service in the Sudan and the Mediterranean littoral. He became ill four months after his return to Britain. He had pyrexia of 11 weeks' duration, moderate anaemia and leucopenia (2,600 per cmm), and a gradually enlarging spleen. All tests, including sternal puncture, were negative and he responded poorly to a course of neostibosan. After a second course of neostibosan a splenectomy was performed and a course of neostam was given. *Leishmania donovani* was found in the spleen. He became afebrile, gained in weight and his blood picture improved. He was eventually discharged cured. This patient showed a persistent lymphocytosis after splenectomy.

The other case was the authors' own, a 24-year-old corporal who developed kala azar in Calcutta and was given a course of treatment (urea-stibamine, 2.9 grammes) to which he responded well clinically. When he returned to England his spleen was still large. He was then given a course of pentostam forte (3.6 grammes). Sternal marrow still showed leishmaniae. After a further course of pentostam (3.6 grammes) sternal marrow was negative in smears and culture, but after a course of pentamidine isethionate (4.32 gm) the sternal puncture culture again became positive. Further courses of pentostam (3.6 gm and 3.6 gm) and pentamidine (2.6 gm and 2.0 gm) each caused a temporary clinical improvement but the man went steadily downhill. His sternal puncture showed no parasites but spleen puncture showed innumerable leishmaniae. His leucocyte count tended to fall after the commencement of each antimony course. This fall was confined mainly to the granulocytes. The spleen (2,736 grammes) was removed, after this the leucocyte count, which was below 2,000, rose to nearly 20,000 per cmm and there was a general all-round improvement which has been maintained for over 6 months. At the time of the splenectomy he was receiving a course of carbostibamide and he was subsequently given another course of pentamidine. The leucocyte count later dropped to the region of 10,000 with a lymphocyte percentage of 55 to 65.

The strain of *Leishmania donovani* isolated from this patient showed no antimony resistance, the authors therefore conclude that this resistance is a character of the patient. They discuss the possibility that early inadequate treatment may lead to antimony resistance. They consider that the leishmaniae were largely confined to the spleen where the blood stasis in the large vessels prevented the specific drugs reaching the parasites in adequate strength so that the spleen acted as a reservoir from whence parasites periodically reseeded other tissues.

They suggest that splenectomy should be considered in selected drug-resistant cases of kala-azar. [Another relapse has since occurred in the present case—a report on this will be published later.]

L. E. N. H.

OSWES, M. Cutaneous Leishmaniasis. A Case Report. *Chung Hwa Yü* [Shanghai] 1948 June v 68 No 8 727

A man of 48 who had lived in Mukden since 1941 complained of an itchy or but painless mass in the left hypochondrium and also of fever and weakness. He was very emaciated and anaemic and had an extensive splenomegaly. Leishman-Donovan bodies were found on sternal puncture.

Neostam treatment was begun and the next day itching papules were seen on the arms, especially on the extensor surface; each papule was surrounded by a pink halo. The papules increased in a few days to small nodules with central necrosis. Many Leishman-Donovan bodies were found in a serous or serous fluid from one of the nodules. The ulcers healed up in a few days without local treatment, as neostam therapy continued. It is added that the patient also had pustular scabies but there was no similarity between the two eruptions and they were treated separately.

The author comments that the patient had the ordinary type of kala-azar frequently seen in Mukden, which was confirmed by the finding of Leishman-Donovan bodies.

The cutaneous eruption on the other hand was unusual in that it appeared when the patient began his first specific treatment and it disappeared during the course of it, thus differing from dermal leishmanoid which usually appears a year or more after visceral manifestations have disappeared. The author states in fact that the skin condition more closely resembled a true cutaneous leishmaniasis.

H. J. O. D. Burke-Gallimore

FEVERS OF THE TYPHUS GROUP

AXELSTEN, L. & WHITNEY, Dorothy M. with technical assistance of Norma W. HANSEN. The Inhibitory Effect of Antiserum Sera on Experimental Rickettsial Infections in the presence of Testicular Extract. *Trans. Roy. Soc. Med. & Biol.* 1948, v 42 No. 3 379-84

This study is in continuation of previous work by AXELSTEN *et al.* on the protective influence exercised by anti-organ sera on experimental rickettsial infection [this *Bulletin* 1948 45 699].

Those interested in this special line of immunological research will desire to read the original paper.

There is as yet no suggestion that the findings have a practical application to the prevention or treatment of typhus fevers.

John W. D. Miller

LIU, Wei-T'ung Well-Felix Reaction in Typhus and Non-Typhus Fevers
Chinese Med J Shanghai 1948, June, v 66, No 6, 291-306 [45 refs]

The author, working at the Peiping Union Medical College Hospital, has made a careful study of the Weil-Felix reaction in 286 typhus patients and in 75 persons not suffering from typhus. Tests were carried out at intervals in these cases and single tests were made in more than 2,300 other cases of febrile diseases. The paper contains a documented summary of the findings of other observers of the reaction and a bibliography with 45 references to the literature.

The findings and conclusions of the author conform generally with those of most other workers on the subject.

In the series of 286 cases of typhus fever the reaction was persistently negative in 6.6 per cent, the maximum titre was 1-40 in 3.5 per cent, it was 1-80 in 8.1 per cent, and 1-160 in 10.1 per cent. Very high titres of 1-2,560 or over occurred in 25.2 per cent.

Among 141 patients tested during the first week positive reactions occurred in 37.6 per cent, during the second week a further 55.3 per cent became positive, and only 6.4 per cent were delayed to the third week.

Among 2,398 cases of fevers other than typhus 7.4 per cent reacted at titres ranging from 1-40 to 1-1,280. Dual infection was suspected in two cases. Among 75 cases of fevers other than typhus in which tests were carried out on several occasions there were 7 in which a falling-titre agglutination occurred, and 12 in which the titres reached 1-80 or 1-160, including two in which dual infection was suspected.

John W D Megaw

SMART, J Llee *British Museum (Natural History) Economic Ser No 2A*
2nd Edition 1948 31 pp, 3 figs [10 refs] Printed by Order of the
Trustees of the British Museum [9d] [Summary appears also in
Bulletin of Hygiene]

Since the first edition of this booklet [see *Bulletin of Hygiene*, 1943, v 18, 316] a very great advance in louse control has been achieved by the use of DDT. The author has introduced several new paragraphs and sections, in the appropriate places, to describe these new methods. But, at the same time, the more efficient of the older methods of louse control are retained, in case of the possibility of louse infestation in circumstances where DDT was not available.

J R Buxvine

HARRISON, J L A Key to the Rats of Malaya Reprinted from *Malayan Nature J* 1948, v 3, No 3, 130-41

Twenty species of rats belonging to the family Muridae, and two species of Rhizomyidae, are briefly described, a key is supplied for their recognition by external characters.

It is stated that Malaysia seems to have been the centre in which rats have originally been evolved, and from which they have spread to the rest of the world.

The paper has been written for the purpose of enlisting the help of amateur naturalists in collecting further information with regard to the rats of Malaya. [See AUDY, below]

John W D Megaw

POMALES LEBRÓN A Studies on Murine Typhus in Puerto Rico *Puerto Rico J Pub Health & Trop Med* 1948, Mar, v 23, No 3, 393-407, 1 fig
[Spanish version 408-21]

This is a summary of work done on murine typhus in Porto Rico, where the existence of the disease was first recognized in 1940, and where, since that time, about 700 cases have been reported from San Juan alone.

[The English version of the paper by an obvious mis-translation later than 700 cases were reported up to 1940.]

Many sera of patients have been examined by the late Col. Harry Platt, who found a striking lack of correlation between the titres of the Weill-Felix complement fixation reactions. For example one case with a Weill-Felix titre of 1-102,400 gave a fixation titre of 1-20 for murine typhus, and 1-16 for epidemic typhus. In one case the epidemic titre was 1-640 and the murine 1-320 though the train was definitely orchitic.

The titres of a number of complement-fixation tests carried out by Dr H. Bengtson are reported. In these the responses to murine antigen were mostly at twice to four times higher titres than those to epidemic typhus but in two cases the titres were the same with both antigens—1-640 and 1-1,024 respectively.

Among 443 rats trapped at San Juan between December 1944 and June 1945 54 per cent gave positive fixation reactions.

The urine and faeces of 12 experimentally infected white rats remained non-infective; the blood became infective in four to seven days and remained so for about three weeks. Infection persisted in the brains of the rats tested at periods ranging from 28 to 191 days after inoculation and in the kidneys, lungs, heart and spleen of two of the rats up to the 29th and 92nd day respectively.

Ten rats were infected by the intraperitoneal route with very large doses of murine rickettsiae; the animals died in three to six days; the urine was infective in four out of seven that were tested, and the faeces in three out of seven.

Great difficulty was experienced in infecting rats by feeding them with heavily infected material; this experience together with the shortness of the period for which infection persisted in the blood and organs of experimentally infected rats does not agree with the theory that feeding on the carcass of dead rats is an important and natural method of transmission among these animals nor with the view that infection with urine or faeces is one of the usual ways of transmission from rat to man.

John W. D. Meers

GRIFF D & PINKERTON H. The Rickettsiostatic Action of Crystalline Penicillin Fractions in Embryonal Eggs. *Proc Soc Exp Biol & Med* 1948 June 1, 68 No. 2, 228-32. [16 refs.]

Penicillin V was found to be two to four times more effective than penicillin G in producing rickettsiostasis in typhus-infected embryonated eggs [murine strain]. Penicillin F di-hydro F and K were much less effective.

These results are regarded as throwing doubts on the validity of the trial of penicillin in human rickettsial infection.

[This point is perhaps of academic interest with regard to the treatment of human typhus now that chloramphenicol has been found so effective.]

John W. D. Meers

SADUSE J F J., HOFFER Constance & FREEDMAN Mildred. Effect of Para Aminoobenzoic Acid upon the Clinical Course Rickettsiemia, and Development of Complement-fixing Antibodies of Murine Typhus in the Guinea Pig. *Amer J Trop Med* 1948 Sept. 28, No. 3, 673-82. [17 refs.]

In the more satisfactory of the two sets of experiment described seven guinea-pigs were treated with PABA for six days. Just after receiving the first dose they were inoculated with murine-typhus rickettsiae. At the same time seven control guinea-pigs were inoculated with similar amount of infective

material and all of them reacted in a typical manner with fever and scrotal reaction. Only one of the animals treated with PABA became febrile, this and one other had a moderate scrotal reaction.

Positive complement-fixation reactions occurred in both treated and control guineapigs, and rickettsial strains were recovered from all the treated animals that were tested between the 4th and 8th day after inoculation. The treated animals in which no clinical manifestations occurred were later found immune to murine infection.

John W D Megaw

WILEY, J S & FRITZ, R F Tentative Report on Expanded Murine Typhus Fever Control Operations in Southern States *Amer J Trop Med* 1948, July, v 28, No 4, 589-97, 6 figs

This paper consists of a succinct and well-illustrated description of the successful control measures organized in the Southern States of the U S A in 1945 against the rat flea. In the 122 counties in which murine typhus was most prevalent the incidence of the disease fell from 5,338 in 1944 to about 2,200 in 1947, and the decline appeared to be due to the systematic dusting with DDT of the holes and other haunts of rats. In the 460 counties in which dusting was not carried out the incidence remained almost constant, the percentage of rats infested by fleas and the *cheopis* index were very much higher than in the "dusted" counties.

The authors recognize that, although dusting gives speedier control than any other measures, lasting results cannot be obtained without systematic action against the rats.

It is stated that, according to present indications, transmission of infection from rat to man does not occur till 15-20 per cent of the rats show evidence of past or present infection. Among the instructive graphs which illustrate the paper there is one showing a remarkably close correlation between the seasonal incidence of the disease and the variations in the *cheopis* index.

Dusting was found to cause a reduction by 80 per cent in the average number of *X cheopis* found on each rat, and a similar reduction in *Nosopsyllus fasciatus*, the rat flea, *Leptopsylla segnis*, the mouse flea, and the two rat mites, *Echidnolaelaps echidninus* and *Laelaps bacoti*. Other ectoparasites were less effectively controlled, the flea, *Echidnophaga gallinacea* was reduced by 35 per cent, the mite *Liponyssus bacoti*, by 47 per cent, and the rat louse, *Polyplax spinulosa*, by 26 per cent.

As long as 180 days after dusting the reduction of *X cheopis* was still 70 per cent.

John W D Megaw

AUDY, J R Natural History and Scrub Typhus Reprinted from *Malayan Nature J* 1948, Sept, v 3, 114-29, 4 figs on 2 pls

This paper, like that of HARRISON [above], is addressed specially to amateur naturalists in Malaya, but professional workers also will find it a very readable and helpful introduction to the mites concerned in the transmission of scrub typhus.

The author expresses the hope that the American name "chigger" for larval trombiculids will be introduced into the English literature because of the unsuitability of the name "harvest mite". He adds, however, the warning that there must be no confusion with the chigoe or jigger flea of Africa, although both this flea and its popular name were originally derived from South America. [It is, perhaps, optimistic to hope that such confusion will not arise, the three names chigger, chigoe, and jigger are probably corruptions of the same Spanish word *chico*, meaning tiny, and their pronunciation is so similar that there is sure to be trouble.]

John W D Megaw

PHILIP C. B. & HOWLAND L. C. The Tropical Rat Mite *Lipomys* as an Experimental Vector of Rickettsialpox. *Am. J. Trop. Med. Hyg.* 1947, v. 23, No. 5 697-703 1 fig.

The authors have found that *Rickettsia* *slovakiae*, the causal agent of rickettsialpox, can be transmitted in the laboratory from mouse to mouse by the rat mite *Lipomys* *hacoti* which is much more widely distributed than the mite *Allothrombomys sanguineus* [the only known natural vector of the disease see this *Bulletin* 1947, v. 44, 411-417 697 and 690].

L. hacoti is known to feed readily on man in New York and elsewhere; it is also known to be an experimental vector and a natural host of murine typhus.

In the present investigation colonies of clean *L. hacoti* were allowed to feed on infected white mice and were later tested for infectivity by letting them feed on young and baby white mice. In the course of numerous experiments of this kind infection was transmitted to one group of four baby mice in each litter which excluded the possibility that transmission had occurred through the swallowing of the mites by the mice. Although this was the only experiment in which transmission by biting was successful, many of the mites which had fed on infected mice actually became infected, as was shown by injecting suspensions of their bodies into mice.

The observations of which details are given are not regarded as indicating that *L. hacoti* is an efficient vector.

Infection was demonstrated in the nymphal progeny of the infected mites and it was found to persist in a colony of mites for at least 34 days.

The author mentions that previous work has indicated a closer immunological relationship to Rocky Mountain spotted fever than to other rickettsial fevers, though the essentially negative Weil-Felix reaction is noteworthy. In a footnote it is stated that attempts to transmit infection by the tick *Dermacentor andersoni* have so far been unsuccessful. The negative Weil-Felix reaction and the transmission of infection through mites rather than ticks provides another instance which complicates reliance on individual characteristics in proposed classifications of the rickettsial fevers such as those earlier offered by Megaw and Felix.

[It should be pointed out that these earlier classifications based on the arthropod vectors and the type of the Weil-Felix response referred only to those rickettsial diseases for which the name typhus was regarded as suitable because of their clinical and pathological resemblance to historical typhus fever. Such rickettsial diseases as trench fever, Q fever, and rickettsialpox cannot variably be called typhus fevers or even typhus-like fevers.]

The antigenic and immunological properties of the typhus and other rickettsial fevers require further study and at present it is simply a question of choosing a provisional classification which will be most helpful to those engaged in the diagnosis, treatment, and control of these diseases. (See B. D. Megaw.)

PLETITSKY D. F. La tique *Dermacentor sibiricus* agent du typhus épidémique en Sibirie occidentale. The Tick *Dermacentor sibiricus* as a Vector of Epidemic Typhus in Western Siberia. *C. R. Acad. Sci. USSR* 1947, 55, No. 9, 877-881 fig. [Summary taken from *Rev. Inf. et Path. Exp.* No. 1948, Nov., v. 36, Pt. 11, 177.]

Apart from Murmelles fever which occurs in the Crimea and is transmitted by *Rhipicephalus sanguineus*, Laty the form of tick-borne spotted fever (atypical typhus) recorded in the Soviet Union has a similar symptom and etiology. The tick vectors are *Dermacentor sibiricus* Osten in south central Siberia (Krasnoyarsk) *Hemaphysalis conspersa* Koch in the Maritime Province of the Russian Far East and *D. sibiricus* Osten and *H. conspersa* in the region of

were the patients treated in the same hospital between 1900 and 1918 and a much larger proportion of these belonged to the higher age groups. The present approach to comparable conditions is found in the 11 patients of the present series who were less than 10 years old and the 19 control patients belonging to the same age group. Among the PARA treated cases the average duration of the fever was 5.8 days; among the controls it was 15.7 days; there was no death in either of these groups of children. It may be suggested that only the severest cases among children were admitted during the period 1900-33 seeing that the average yearly admission rate was just over one as compared with 11 in 1947. But even if the fullest allowance is made for disturbing factors the remarkably rapid improvement observed in the clinical condition strongly suggests that the drug was very effective.

Among the five patients in the present series who were over 20 years old the average duration of the fever was less than 8 days; whereas among the 36 controls of the same age group the average duration was about 17 days among the survivors of whom there were only 18.

A significant feature of the study was that treatment was started early, less than four days on the average after the onset. To adults a large initial dose of 8.0 gm. was given, and this was followed by doses of 3.0 gm. every two hours till the temperature fell to normal or longer if the clinical condition remained unsatisfactory. For children the dosage was generally two-thirds of the adult quantity.

In severe cases 3.0 to 6.0 gm. were given intravenously in the form of a 20 per cent. solution of sodium PARA at the same time as the first oral dose.

The blood level aimed at was 40 mgm. per 100 cc. but it appears that in one child aged eight years a level of 111 mgm. was reached on the fourth day of treatment after a total dosage of 117 gm. orally and 6.0 gm. intravenously. No harmful results were observed from high blood levels maintained for short periods of time.

[Comparative tests of PARA and chloromycetin will doubtless be made in fevers of the typhus group; the latter drug appears to be more active especially for patients admitted after the 6th day. (See this Bulletin 1948 v. 45 1076 1077 1949 v. 46 27 131.) J. H. D. M.]

FINCHAM M. C., GUY E. G., LISTER L. M., WOODWARD T. L. & SWARTZ J. E. The Treatment of Rocky Mountain Spotted Fever with Chloromycetin. *Ann Intern Med* 1948 Oct. 29 v. 4 656-67 125.

Chloromycetin was given with remarkably good results in 15 patients suffering from Rocky Mountain spotted fever at the University Hospital, Baltimore in May, June and July 1948.

The average duration of the fever after the first dose was 4 days, the longest period being 16 hours. Striking improvement in the general condition was always observed by the end of the second day and in most cases convalescence was established within three days.

Rickettsiae had been isolated from the blood of seven patients and in all of these cases samples taken two days after the first dose was given were no longer infective but the development of agglutinin and complement fixing antibodies seemed to progress in the usual way.

In a few cases there was vomiting after the first or second dose; this was suspected of being due to psychic factors and the bitter taste of the drug.

No other evidence of toxicity was found though regular examination of the blood and urine were made.

[The controls were not strictly comparable; there were 46 cases treated at the hospital between 1900 and 1948 and it seems possible that fewer mild

cases were being admitted during that period. Comparison with the effects of treatment by *para*-aminobenzoic acid as reported by WOODWARD *et al* (see above) may be more appropriate, in that series the average duration of the fever after the first dose was 3.2 days. But the evidence of the efficacy of chloromycetin is very convincing.]

The drug was given by the mouth, in most cases 0.5 gm was given every three hours till the rectal temperature had remained below 100°F for 24 hours. The first dose was given in three parts at intervals of one hour. The dose for children under 16 years of age was half the above.

The authors suggest the possibility of the occurrence of latent infection after an incomplete course of treatment.

[For previous reports of the effect of the drug in the treatment of epidemic typhus and scrub typhus see this *Bulletin*, 1948, v 45, 779, 1077, 1949, v 46, 27.]

John W D Megaw

COOKE, C. Rocky Mountain Spotted Fever treated with Aureomycin. *J Amer Med Ass* 1948, Nov 20, v 138, No 12, 885, 1 chart

Rocky Mountain spotted fever is not uncommon in the eastern part of Long Island, N Y and there are usually 10 to 15 cases annually in Suffolk county. The mortality varies throughout the country in some places and in some years from 15 per cent to as high as 37.5 per cent in the Bitter Root Valley.

The author records the case of a woman of 28 who was admitted to Huntington Hospital in July, 1948 with a three-day history indicating an acute exanthem. In the previous two weeks she had found two or three embedded ticks on her body, the last about six days before the illness began. There was no history of exposure to contaminated food or water or evidence of rat or louse infestation.

The clinical examination which is described suggested a diagnosis of Rocky Mountain spotted fever. Pending results of blood culture to exclude meningococcaemia, 900,000 units of penicillin in 3 doses at intervals of six hours were given and discontinued when the blood culture proved negative.

Some aureomycin was obtained and given orally from the day after admission (the fourth day of illness) in a dosage of 1 gm every six hours for 48 hours at the beginning of treatment, the rash was pronounced and violaceous and the temperature was spiking to 104°F. After 48 hours of treatment, it had returned to normal and the symptoms had abated dramatically. The dosage of aureomycin was reduced to 0.5 gm every 6 hours for the next 24 hours, making a total of 10 gm. There was no evidence of toxicity other than that of transitory (and probably unrelated) nausea and vomiting. Improvement continued, the rash had gone on the ninth day and the patient was discharged on the tenth. Blood, urine and stool examinations and cultures were negative, as were serological tests, except that on the fourth day (when other agglutination and complement-fixation tests were negative), the patient's serum agglutinated *Proteus OX19* at a titre of 1/40. On the tenth day, however, the reaction to the complement-fixation test was positive for Rocky Mountain spotted fever in a titre of 1/88. This was confirmed by Dr Cox at the Lederle Laboratories who reported a positive result at 1/64. The reaction to rickettsialpox complement-fixation (which has been found to be somewhat more sensitive in detection of "spotted fever" early in the disease) also became positive, in lower titre, by the tenth day.

The author observes that in a disease where a severe febrile course of 2 to 3 weeks might be expected, response to aureomycin was prompt and that this is further evidence of its efficacy against the rickettsiae of Rocky Mountain spotted fever.

H J O'D Burke-Gaffney

LACKMAN D & PARKER R. R. Comparison of the Immunogenic and Anaphylactogenic Properties of Rocky Mountain Spotted Fever Vaccines prepared from Infected Yolk Sacs and from Infected Tick Tissues. *Am J Pub Health* 1948, Oct. v 38 No. 10 1402-4

Rocky Mountain spotted fever vaccines prepared from infected yolk sacs and from tick tissues were about equally active in producing immunity in guinea pigs. The protein present in the tick tissue vaccines failed to produce anaphylaxis in guinea pigs whereas that present in yolk-sac vaccines produced anaphylaxis in 58 per cent of the guinea pigs tested

JELLINEK W. L., BELL E. J., HUENNER, R. J., PARKER R. R. & WELSH H. R. Q Fever Studies in Southern California. IV Occurrence of *Coxiella burnetii* in the Spinose Ear Tick, *Otobius megnini*. *Pub Health Rpt. Wash.* 1948 Vol. 17 v 63 No 46 1483-9 [1st refs.]

The authors have isolated 10 strains of Q-fever rickettsiae from batches of nymphal ticks belonging to the family of Argasidae. The ticks were *Otobius megnini* which were collected from the ears of cattle belonging to four dairies in which the organism had been isolated from raw milk. In one of the dairies cases of Q fever had occurred among persons employed in the dairy. (See this *Bulletin* 1943 v 45 509)

Altogether 246 lots of ticks were examined in the course of the investigation. Evidence of transmission of the disease by ticks in California had hitherto been lacking because ticks had never been found on cattle of the infected herds, but after attention had been called to the occurrence of *O. megnini* on cattle of similar herds a search was made with the interesting result that infection had been discovered for the first time in the U.S.A. among Argasid ticks.

It is stated that in addition to the two species of *Dermacentor* and one of *Amblyomma* already found naturally infected in the U.S.A. two other species of ticks have been found naturally infected in that country, but the data have not yet been published.

One lot of four infected ticks was found on a cow whose serum gave a positive complement fixation reaction at 1:128. Another lot of five was from a cow reacting at 1:8. The other lot of infected ticks consisting of 20-3 were from batches of cows, only some of which gave positive reaction.

The guinea pigs employed in isolating the strains gave typical febrile reactions, fixation responses at titres of 1:128 to 1:2048 and typical lesions of experimental Q fever were found, including numerous rickettsiae in areas of the exudate at the site of subcutaneous inoculation.

Although *O. megnini* is the first Argasid tick found naturally infected in the U.S.A. (this *Bulletin* 1943 v 40 805) has reported experimental infection in two other species, *Ornithodoros monticola* and *O. hermsi* and in the former of these transovarial infection has been reported. A *O. megnini* feed upon a single host this type of infection must occur if the ticks are ectoparasites of the livestock.

The authors appear to have accepted the view of PHILLIPS that the organism of Q fever belongs to a genus distinct from the true rickettsiae and has adopted the name *Coxiella burnetii* instead of the original name *R. burnetii* and the name *R. ad. parvum* formerly used in the U.S.A. (see this *Bulletin* 1948 45 474)

J. H. D. MERRILL

DE RODA-HUENNE, Enid C. Cross-immune Reactions between Panamanian Strains of Q Fever and Endemic Typhus. *Trans. J. Trop. Med.* 1947, Sept. v 28 No. 3 663-8.

Four of six guinea pigs which had been immunized against murine typhus were regarded as showing a partial degree of immunity when challenged with

an inoculation of a Panama strain of Q fever, the average duration of the incubation period and of the fever was appreciably shorter than in the four control animals. Two other guineapigs immunized in the same way were challenged with a yolk-sac suspension of the same strain of Q fever, they and the two controls were equally overwhelmed by the challenging strain.

In the reverse experiments, 12 guineapigs convalescent from experimentally produced Q fever were challenged with murine-typhus infection and showed no significant protection against the febrile reaction, but only two of them developed scrotal reactions whereas nine of the twelve control animals had reactions.

With complement-fixation tests no significant cross reactions were observed.

[Some workers may doubt whether such degrees of partial immunity as were observed in these experiments are due to specific rickettsial antibodies. Guinea-pigs convalescent from attacks of experimental rickettsial diseases are not strictly comparable with previously healthy control animals.]

John W D Megaw

OLIPHANT, J W & PARKER, R R Q Fever Three Cases of Laboratory Infection *Pub Health Rep Wash* 1948, Oct 15, v 63, No 42, 1364-70, 3 figs

Three cases of laboratory infection with Q fever are described, they occurred in August 1947, January 1948, and February 1948, respectively, at the Rocky Mountain Laboratory where work on the rickettsiae of the disease has been carried out more or less continuously since 1935.

Mention is made of three previous cases which occurred among employees of the laboratory in January 1941, April 1941, and March 1942. One of these persons had not been known to have been in contact with the block of buildings in which work on Q fever was being done.

One of the present patients was employed in a unit engaged in the production of Q fever yolk-sac vaccine, another was working in a unit in which animal inoculations with Q fever rickettsiae were carried out, the third was a frequent visitor to the office rooms of the Laboratory.

The mode of infection is not discussed.

John W D Megaw

RABIES

KOPROWSKI, H & COX, H R Occurrence of Rabies Virus in the Blood of Developing Chick Embryo *Proc Soc Exper Biol & Med* 1948, July-Aug, v 68, No 3, 612-15 [12 refs]

The authors, in the course of previous studies on rabies infection in the developing chick embryo (*J Bacteriology*, 1947, v 54, 74, abstract of a paper read at a meeting of the Society of American Bacteriologists), had obtained results, which indicated a distribution of rabies virus throughout the tissues of the embryo with no particular affinity to the central nervous system and which suggested a haematological spread of the virus and, therefore, presence of the virus in the blood of the embryo.

In connexion with the latter possibility, the authors carried out a further series of experiments, the results of which may be summarized as follows.

Rabies virus (FLURY strain) was inoculated by the yolk-sac route into 7-day-old chick embryos. By means of intra-cerebral injections into albino Swiss mice, 21 to 28 days old, the virus was recovered from the chick-embryo

LACKMAN D & PARKER, R. R. Comparison of the Immunogenic and Anaphylatogenic Properties of Rocky Mountain Spotted Fever Vaccines prepared from Infected Yolk Sacs and from Infected Tick Tissues. (See *J. Pub Health* 1948 Oct., v 38 No. 10 1407-4)

Rocky Mountain spotted fever vaccines prepared from infected yolk sacs and from tick tissue were about equally active in producing immunity in guinea pigs. The protein present in the tick tissue vaccines failed to produce anaphylaxis in guinea pigs whereas that present in yolk-sac vaccines produced anaphylaxis in 33 per cent of the guinea pig tested.

JELLISON W. L., BELL E. J., HUTCHINS R. J., PARKER R. R. & WALSH J. H. Q Fever Studies in Southern California. II. Occurrence of *Coxiella burnetii* in the Spinose Ear Tick, *Otiobius murrayi*. *Pub Health Rep. Wash.* 1948 Nov. 12, v 63 No. 46 1483-9. (1st ref.)

The authors have isolated 10 strains of Q-fever rickettsia from batches of nymphal ticks belonging to the family of Argasidae. The ticks were *O. murrayi* which were collected from the ears of cattle belonging to four dairies in which the organism had been isolated from raw milk. In one of the dairies cases of Q fever had occurred among persons employed in the dairy. (See this Bulletin 1943 v 43 509)

Altogether 46 lots of ticks were examined in the course of the investigation. Evidence of transmission of the disease by tick in California had hitherto been lacking because ticks had never been found on cattle of the infected herd, but after attention had been called to the occurrence of *O. murrayi* on cattle of similar herds a search was made with the interesting result that infection has been discovered for the first time in the U.S.A. among Argasid ticks.

It is stated that in addition to the two species of *Dermacentor* and one of *Haemaphysalis* already found naturally infected in the U.S.A. two other species of ticks have been found naturally infected in that country, but the data have not yet been published.

One lot of four infected ticks was found on a cow whose serum gave a positive complement-fixation reaction at 1:128. Another lot of five was from a cow reacting at 1:8. The other lots of infected ticks comprised of 20-25 were from batches of cows, only some of which gave a positive reaction.

The guinea pig employed in isolating the strains gave typical febrile reactions, fixation responses at titres of 1:128 to 1:2,048 and typical lesions of experimental Q fever were found including numerous rickettsiae in masses of the exudate at the site of subcutaneous inoculation.

Although *O. murrayi* is the first Argasid tick found naturally infected. Dyer (this Bulletin 1943 v 40 905) has reported experimental infection in other species *Ornithodoros montanus* and *O. hermsi* and in the form of trans-ovarial infection has been reported. A *O. murrayi* feed only on a single host this type of infection must occur if the tick is a vector of the disease.

The authors appear to have accepted the view of PARKER that the organism of Q fever belongs to a genus distinct from the true rickettsiae and have adopted the name *Coxiella burnetii* in stead of the original name *R. burnetii* and the name *R. diaforica* formerly used in the U.S.A. (See this Bulletin 1949, 49 441)

J. H. D. M. J.

DE ROPANICHE, ENID C. Cross-Immune Reactions between Panamanian Strains of Q Fever and Endemic Typhus. (See *J. Trop. Med.* 1949 Sept. v 28 No. 5 683-6)

Four of six guinea pigs which had been immunized against murine typhus were regarded as showing a partial degree of immunity when challenged with

an inoculation of a Panama strain of Q fever, the average duration of the incubation period and of the fever was appreciably shorter than in the four control animals. Two other guineapigs immunized in the same way were challenged with a yolk-sac suspension of the same strain of Q fever, they and the two controls were equally overwhelmed by the challenging strain.

In the reverse experiments, 12 guineapigs convalescent from experimentally produced Q fever were challenged with murine-typhus infection and showed no significant protection against the febrile reaction, but only two of them developed scrotal reactions whereas nine of the twelve control animals had reactions.

With complement-fixation tests no significant cross reactions were observed.

[Some workers may doubt whether such degrees of partial immunity as were observed in these experiments are due to specific rickettsial antibodies. Guineapigs convalescent from attacks of experimental rickettsial diseases are not strictly comparable with previously healthy control animals.]

John W D Megaw

OLIPHANT, J W & PARKER, R R Q Fever Three Cases of Laboratory Infection. *Pub Health Rep Wash* 1948, Oct 15, v 63, No 42, 1364-70, 3 figs

Three cases of laboratory infection with Q fever are described, they occurred in August 1947, January 1948, and February 1948, respectively, at the Rocky Mountain Laboratory where work on the rickettsiae of the disease has been carried out more or less continuously since 1935.

Mention is made of three previous cases which occurred among employees of the laboratory in January 1941, April 1941, and March 1942. One of these persons had not been known to have been in contact with the block of buildings in which work on Q fever was being done.

One of the present patients was employed in a unit engaged in the production of Q fever yolk-sac vaccine, another was working in a unit in which animal inoculations with Q fever rickettsiae were carried out, the third was a frequent visitor to the office rooms of the Laboratory.

The mode of infection is not discussed.

John W D Megaw

RABIES

KOPROWSKI, H & COX, H R Occurrence of Rabies Virus in the Blood of Developing Chick Embryo. *Proc Soc Exper Biol & Med* 1948, July-Aug, v 68, No 3, 612-15 [12 refs]

The authors, in the course of previous studies on rabies infection in the developing chick embryo (*J Bacteriology*, 1947, v 54, 74, abstract of a paper read at a meeting of the Society of American Bacteriologists), had obtained results, which indicated a distribution of rabies virus throughout the tissues of the embryo with no particular affinity to the central nervous system and which suggested a haematological spread of the virus and, therefore, presence of the virus in the blood of the embryo.

In connexion with the latter possibility, the authors carried out a further series of experiments, the results of which may be summarized as follows.

Rabies virus (FLURY strain) was inoculated by the yolk-sac route into 7-day-old chick embryos. By means of intra-cerebral injections into albino Swiss mice, 21 to 28 days old, the virus was recovered from the chick-embryo

LACOMAX D & PARKER R. R. Comparison of the Immunogenic and Anaphylactogenic Properties of Rocky Mountain Spotted Fever Vaccines prepared from Infected Yolk Sacs and from Infected Tick Tissues. *Am J Pub Health* 1948 Oct., 38 No. 10 1407-4

Rocky Mountain spotted fever vaccines prepared from infected yolk sacs and from tick tissues were about equally active in producing immunity in guinea pigs. The protein present in the tick tissue vaccines failed to produce anaphylaxis in guinea pigs whereas that present in yolk-sac vaccines produced anaphylaxis in 59 per cent of the guinea pig tested.

JELLINEK W. L., BELL E. J., HUEBNER R. J., PARKER, R. R. & WILSON H. H. Q Fever Studies in Southern California. IV Occurrence of *C. stellata* in the Spinose Ear Tick, *O. virescens*. *Pub Health Rep Wash* 1949 Nov 19, 63 No. 46, 1483-9 (12 refs.)

The authors have isolated 10 strains of Q-fever rickettsiae from batches of nymphal ticks belonging to the family of Argasidae. The ticks were *O. virescens* which were collected from the ears of cattle belonging to four dairies in which the organism had been isolated from raw milk. In one of the dairies cases of Q fever had occurred among persons employed in the dairy. (See this Bulletin 1948, 45 509)

Altogether 246 lots of ticks were examined in the course of the investigation.

Evidence of transmission of the disease by tick in California had hitherto been lacking because ticks had never been found on cattle of the infected herds, but after attention had been called to the occurrence of *O. virescens* on cattle of similar herds a search was made with the interesting result that infection has been discovered for the first time in the U.S.A. among Argasid ticks.

It is stated that in addition to the two species of *Dermacentor* and one of *Amblyomma* already found naturally infected in the U.S.A. two other species of ticks have been found naturally infected in that country, but the data have not yet been published.

One lot of four infected ticks was found on a cow whose serum gave a positive complement fixation reaction at 1:128, another lot of five was from a cow reacting at 1:8. The other lots of infected tick, consisting 120-25 were from batches of cows only some of which gave positive reaction.

The guinea pig employed in isolating the strain gave typical wheal reactions, fixation responses at titres of 1:128 to 1:648 and typical lesions of experimental Q fever were found, including numerous rickettsiae in smears of the exudate at the site of subcutaneous inoculation.

Although *O. virescens* is the first Argasid tick found naturally infected. Davis (this Bulletin 1943, 40 903) has reported experimental infection in the other species *Ornithodoros monstrosus* and *O. hermsi* and in the former of these transovarial infection has been reported. A *O. virescens* fed only on a single host this type of infection must occur if the tick is a vector of the disease.

[The authors appear to have accepted the view of Purcell that the organism of Q fever belongs to a genus distinct from the true rickettsiae and have adopted the name *Coxiella burnetii* in stead of the original name *R. burnetii* and the name *R. disporica* formerly used in the U.S.A. (See this Bulletin 1948, 45 471)]

DE KROSTCHKE, Erik C. Cross-immune Reactions between Panamanian Strains of Q Fever and Endemic Typhus. *Am J Trop Med* 1948, Sept., 28 No. 5 693-4.

Four of six guinea pigs which had been immunized against murine typhus were regarded as showing a partial degree of immunity when challenged with

an inoculation of a Panama strain of Q fever, the average duration of the incubation period and of the fever was appreciably shorter than in the four control animals. Two other guineapigs immunized in the same way were challenged with a yolk-sac suspension of the same strain of Q fever, they and the two controls were equally overwhelmed by the challenging strain.

In the reverse experiments, 12 guineapigs convalescent from experimentally produced Q fever were challenged with murine-typhus infection and showed no significant protection against the febrile reaction, but only two of them developed scrotal reactions whereas nine of the twelve control animals had reactions.

With complement-fixation tests no significant cross reactions were observed.

[Some workers may doubt whether such degrees of partial immunity as were observed in these experiments are due to specific rickettsial antibodies. Guineapigs convalescent from attacks of experimental rickettsial diseases are not strictly comparable with previously healthy control animals.]

John W D Megaw

OLIPHANT, J W & PARKER, R R Q Fever Three Cases of Laboratory Infection *Pub Health Rep Wash* 1948, Oct 15, v 63, No 42, 1364-70, 3 figs

Three cases of laboratory infection with Q fever are described, they occurred in August 1947, January 1948, and February 1948, respectively, at the Rocky Mountain Laboratory where work on the rickettsiae of the disease has been carried out more or less continuously since 1935.

Mention is made of three previous cases which occurred among employees of the laboratory in January 1941, April 1941, and March 1942. One of these persons had not been known to have been in contact with the block of buildings in which work on Q fever was being done.

One of the present patients was employed in a unit engaged in the production of Q fever yolk-sac vaccine, another was working in a unit in which animal inoculations with Q fever rickettsiae were carried out, the third was a frequent visitor to the office rooms of the Laboratory.

The mode of infection is not discussed.

John W D Megaw

RABIES

KOPROWSKI, H & COV, H R Occurrence of Rabies Virus in the Blood of Developing Chick Embryo *Proc Soc Exper Biol & Med* 1948, July-Aug, v 68, No 3, 612-15 [12 refs]

The authors, in the course of previous studies on rabies infection in the developing chick embryo (*J Bacteriology*, 1947, v 54, 74, abstract of a paper read at a meeting of the Society of American Bacteriologists), had obtained results which indicated a distribution of rabies virus throughout the tissues of the embryo with no particular affinity to the central nervous system and which suggested a haematological spread of the virus and, therefore, presence of the virus in the blood of the embryo.

In connexion with the latter possibility, the authors carried out a further series of experiments the results of which may be summarized as follows.

Rabies virus (FLURY strain) was inoculated by the yolk-sac route into 7-day-old chick embryos. By means of intra-cerebral injections into albino Swiss mice, 21 to 28 days old, the virus was recovered from the chick-embryo

blood from the 3rd to the 15th post inoculation day. Such finding was practically constant irrespective of the use for mouse inoculation of chick-embryo red blood cell in saline solution or of chick-embryo plasma undiluted or in serial tenfold dilutions with 10 per cent. rabbit serum-saline.

These results do not of course help to solve the still highly controversial question whether rabies virus is present in the blood of infected mammals.

G. Stuart

PAWAX, J. L. Fruit Eating Bats and Paralytic Rabies in Trinidad. *J. Trop. Med. & Parasit.* 1948 Sept. v. 4, No. 2 173-7

For the past 16 years it has been generally recognized that the paralytic rabies of man and animal in Trinidad is ordinarily spread by the bite of the blood-sucking vampire bat *Desmodus rotundus* *synonymus* Wagner family *Desmodontidae*.

Two facts suggested however the possibility of vicarious rabies transmission to mammals by the bite of fruit-eating *Phyllostomidae* bat—normally non-blood feeders, viz (1) in Brazil during 1921 it had proved possible to produce paralytic rabies in rabbit and guinea pigs by the intramuscular injection of the brain of a "leaf nose" bat, *Phyllostomus* *sp. perillatum* Bornmeister and (2) in Trinidad a total of five fruit-eating bats, *Artibeus planicostatus* Latr—the commonest species found there—had been shown to have Negri bodies in their brains.

To determine definitely whether fruit-eating bats do at times bite mammals and so produce rabies was the object of the experiments described by the author in the present article.

Results showed that—as with the blood-sucking vampire bat—fruit-eating *Artibeus* bats may prove refractory to infection with rabies virus—but though they may not manifest any evidence of disease their saliva may carry infection. Fruit-eating bat when infected with rabies may bite mammals—not necessarily with the object of obtaining blood for food, but on account of a change in habit through being rabid. Mammals so bitten may develop rabies.

C. Stuart

JOHNSON, H. V. Dengue: Vampire Bat Rabies in Mexico. *Amer. J. Hyg.* 1948, Mar. v. 47 No. 2 169-94 18 of 1

Dengue (*el troyal* in some localities) is the ordinary Spanish name for a highly fatal paralytic disease of livestock, especially cattle, which for nearly half a century has been prevalent in the Pacific coast States of Mexico and which in recent years has spread further and further inland as well as to the southwest.

In 1932 a virus which was considered to be the specific aetiological agent of dengue had been isolated from affected cattle but although its symptomatology and pathology the experimental disease produced by this virus closely resembled rabies, the antigenic relationship of the viruses of the two diseases had not been determined.

Moreover on epidemiological grounds doubts had been cast on probable relationship from the fact that dengue was often epizootic in areas where canine rabies was unknown and that despite the noted similarity of dengue to paralytic rabies of vampire bat origin, vampire bat had not been shown to be in areas where dengue was abundant.

In 1943 from a specimen of brain tissue obtained from a cow exhibiting the characteristic paralytic disease was recovered a virus which later proved to be antigenically related to known strains of rabies virus.

Following on this finding the author was requested in 1944 by the Natural Sciences Division of the Rockefeller Foundation to undertake an epizootic

by a total of 24 gm. sulphadiazine or sulphathiazole for eight days. Antisera serum was also given—100 cc. on the 4th day and 25 cc. on each of the two following days.

By the 9th day the temperature fell to normal after a very severe illness. On the 11th day it rose again though plague bacilli could no longer be found in the sputum. Penicillin was then given for five days—700,000 units daily—and a further course of sulphonamide drugs totalling 30 gm. was given. From the 14th day the temperature remained normal and the patient made a good recovery. The first patient had received inoculation of live avirulent plague vaccine on several occasions the last being 10 days before his illness. The second patient had not been vaccinated.

John H. D. Miller

HARRISON J. L. & WOODVILLE H. C. An Attempt to control House Rats in Rangoon. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1948 Nov., v. 4, N. 3 247-53, 1 fig.

The chief impression conveyed by this paper is that rat destruction by poisoning with barium carbonate is unlikely to make more than a partial and temporary impression on the rat population. In a large area in which preliminary baiting in accordance with accepted practice preceded the distribution of the poison it was found that the number of rats trapped nightly was reduced by about 60 per cent. The author concludes that barium carbonate is a low efficiency poison though in the summary he describes the results as satisfactory.

Figures quoted in the paper to show the results of previous efforts to control rats in Rangoon by trapping are interesting. In 1931 and the following four years the numbers of rats trapped were respectively 734,000, 69,000, 731,000, 718,000 and 569,000. [These figures suggest that trapping as carried out may almost be regarded as having a favourable influence on the rat population—from the point of view of the rats—by helping to maintain a satisfactory balance between the rat population and their food supply.]

In the present attempt at rat control gassing with Cyman gas gave poor results and so did trapping during the period May to November 1945.

The rodents found in Rangoon were *Bandicota bengalensis* (31 per cent.), *Rattus exulans* (45 per cent.), *A. stultus* (8 per cent.), *A. norvegicus* (6 per cent.), *Mus musculus* (5 per cent.) and the shrew *S. new-cornutus* (4 per cent.).

Plague infection was found in 9 of 41 *R. rattus* and in 1 of 75 *B. bengalensis*. The fleas found were *Xenopsylla asiatica* and *X. cheopis*.

On *R. rattus* which was regarded as the chief reservoir of infection the average number of *X. cheopis* was 0.30 and of *X. asiatica* 0.23.

John H. D. Miller

WILCOX, A. & PEARCE, J. Indices of ecto-parasitism and the control of ectoparasites in Rats with DDT. *Riv. Chilena de Hig. y Med. Preventiva* 1948, June 16 N. 13 31-35 3 figs. 51 refs.

POLLITZER R. Plague and Plague Control in China. *Chin. Med. J.* Shanghai 1948 June 64, N. 6 324-33.

The author is an Epidemiologist of the World Health Organization in China Mission. He has presented a clear and succinct description of the plague situation in China during 1946 and 1947. The Province of Fukien was most severely affected having 6,141 reported cases in 1946 and 1,541 in 1947. The Provinces of Yunnan, Kwantung (Chekiang) and Kiangsu were less affected the number of cases ranging from 173 to 823.

The recent importation of the disease from Burma is regarded as a repetition of the invasion of more than 100 years ago, of which the final culmination was the historic outbreak at Canton and Hong Kong in 1894. The epidemiology of the disease in China appears to have been very similar to that observed in India. Points of interest are the frequent occurrence of pestis minor and the absence of septicaemic cases in Yunnan, and the occasional occurrence of limited outbreaks of primarily pneumonic plague in areas free from the disease. These outbreaks were always due to the arrival of a traveller from infected areas. Sulphadiazine is regarded as the best of the sulphonamide drugs. Reports of the cure of 50 per cent of cases of primary pneumonic plague at Mukden are not regarded as being based on satisfactory evidence.

Inoculation with formol-killed vaccine is regarded as definitely useful though it is not yet popular in China where even the medical men are said to be haunted by the quite unwarrantable fear of the negative phase.

Some observations are mentioned which suggest that persons exposed to risk of infection by pneumonic plague may be protected by prophylactic treatment with 3.0 gm sulphathiazole daily for three days.

John W D Megaw

CHOLERA

ZAKI, A & RAGAB, M M. Circulatory Dynamics in Cholera. Their Mechanism and Prognostic Significance. *J Roy Egyptian Med Ass* 1948, Oct, v 31, No 10, 770-85.

The circulatory changes in cholera were studied in relation to the degree of dehydration occurring, with consequent haemo-concentration and oligæmia. It was found that venous pressure was lowered in all cases and that the degree of lowering was proportionate to the severity of the case. Additional factors contributing to the fall in venous pressure were the increased viscosity of the blood, compensating vasoconstriction and loss of muscle tone. Arterial pressure is also lowered but is related to clinical severity to a lesser degree, the higher the diastolic pressure the better the prognosis. The circulation time was found to be only slightly prolonged and of no value in prognosis. Pulse rate is not a dependable sign. The circulatory failure in cholera is considered to be peripheral in origin.

J Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

STEWART, G T. The Role of Bacteria in Intestinal Amoebiasis in Man. *Ann Trop Med & Parasit* 1948, Sept, v 42, No 2, 198-206 [31 refs]

The bacterial flora of the intestines of 101 men suffering from amoebiasis was compared with that of 120 patients with no intestinal disorder. In early dysenteric cases there was a marked increase in the frequency of *Bact aerogenes*, and in late relapsing cases with chronic lesions in various stages of activity a significant increase of non-lactose-fermenting bacteria mainly identified as paracolon bacilli. The prevalence of *Strep faecalis* in both groups was thought to be a result of intestinal hurry [this *Bulletin*, 1948, v 45 788]. None of the recognized pathogens was isolated. Agglutinins to the predominant organisms were not found in the sera of the patients. It is considered that the increased

incidence of *Bact. aerogenes* is associated with the acid reaction of the stool and that the paracolonic bacilli and *Bact. coli* are potential pathogens introducing an added element of bacterial infection in a bowel which is the site of amoebic colitis. These findings may be related to the occurrence of "post-dysenteric colitis" and to the observation that cases of amoebic dysentery sometimes benefit from treatment with antibacterial agents.

J. C. Crumckhorn

SAMUEL, E. The Radiological Diagnosis of Chronic Amoebic Colitis. *Brit. J. Radiol.* 1943 Dec. v 21 No. 252, 425-31 10 figs.

This paper discusses the indications for and the place of radiology in the diagnosis of chronic amoebic colitis and also discusses the methods used. Most of the material and radiographs illustrating it are the same as those presented in the paper in which the present author collaborated with BREXER and SHEDDEN (this Bulletin 1940 v 48 148).

H. J. O. D. Burke-Gaffney

PARNELL, R. W. Diiodoquin compared with E.B.I. and Chinolone in the Early Treatment of Amoebic Dysentery in Burma. *J. Trop. Med. & Hyg.* 1943 Oct. v 51 No 10 200-202.

For this report only those cases have been selected in which a follow-up consisting of clinical examination, sigmoidoscopy and microscopic examination of three specimens of stool was completed after the courses of treatment described. The diagnosis was based in each case on finding typical motile *E. histolytica*.

Course I consisted of emetine E.B.I. and chunoion retention enemas (34 patients). 1 patients tested for cure one month after leaving hospital showed 14 apparently cured (=66 per cent). 13 patients tested one and again at two months showed 10 apparently cured (=77 per cent).

Course II consisted of emetine and diiodoquin (34 patients). 23 tested for cure one month after leaving hospital showed 18 apparently cured (=79 per cent). 11 tested at one and again at two months showed 7 apparently cured (=64 per cent).

The details of the courses are as follow —

Course I

Emetine 1 grain daily on days 1 to 8 and sulphaguanidine (a total of 100 gm. during days 1 to 3).

E.B.I. 4 grains daily on days 7 to 12 and chunoion retention enema (1 per cent.) on days 10 to 16.

Rest on days 17 to 19.

E.B.I. 3 grains daily on days 20 to 25.

Course II

Emetine 1 gram daily on days 1 to 6 and sulphaguanidine (a total of 100 gm. during days 1 to 3).

Diiodoquin 9.6 grains (3 tablets) 12 or 16 times daily on days 7 to 18.

In Group I nine had recent or associated bacillary colitis 6 of them had received sulphaguanidine for acute diarrhoea and 6 more had a history of bacillary dysentery.

In Group II (diiodoquin, 34 cases) 7 had a recent or a associated acute bacillary colitis on admission, 11 had received sulphaguanidine for acute diarrhoea 4 others had a history of bacillary dysentery.

In both groups only 37 per cent had no previous history recorded for acute diarrhoea in India or Burma.

It is concluded that in two groups treated early for amoebic dysentery in Burma no difference in effectiveness of treatment was noted between them

A relapse rate of more than 20 per cent was found within two months of treatment, by means of the standards of follow-up described

[It is not stated in what form the E B I was administered it has been shown that it is not absorbed in tablet form This appears to be the real gist of the matter] *P Manson-Bahr*

[The author, in a personal communication, has confirmed that the dosage schedules as given above are correct in the form in which they were set out in the original paper, there was some ambiguity —Ed]

ARMSTRONG, T G, POOLER, N R & ELSDON-DEW, R *Chlorobexol Clinical Trial of a New Treatment for Amoebiasis South African Med J* 1948, Nov 13, v 22, No 21, 691-2

The Amoebiasis Research Committee of the Natal Coastal Branch of the South African Medical Association investigated the claim, advertised to the medical profession, that Chlorobexol was a curative agent in amoebiasis

The active ingredients of this preparation are stated to be chlorophenoxy acid tetrachlor-para-benzoquinone, 2 per cent, hydrocarbon derivatives, 5 per cent, uranium chloride, 1 in 1,000,000

The preparation was used in 29 African patients, all of whom showed ulceration of the bowel and in whom vegetative forms of *E histolytica* were found in stools or scrapings Results were assessed in 7, 14 and 21 days in a number of patients treatment with emetine and diodoquin had to be given before the end of the test period, owing to serious deterioration in their general health The tests with chlorobexol were compared with a series of 50 cases treated with emetine (1 grain daily for 10 days) or diodoquin (10 tablets daily for 20 days)

The criteria in all cases were

(1) Ulcers covered with epithelium, no amoebae in scrapings and stools 'success'

(2) Open ulcers, no demonstrable amoebae probable failures

(3) Open ulcers and demonstrable amoebae absolute failures

After 14 days there was only one success out of the 29 patients, and after 21 days, there were only 2 successes in the 19 patients then remaining In the case of those controls treated with emetine, there were 25 successes out of 50 after 21 days and with diodoquin there were 29 out of 50

It is noted that among the 17 out of 19 patients who showed visible ulcers in the colon at the 21st day of chlorobexol treatment, none showed amoebae in the stools, but no less than 10 showed active amoebae in scrapings from ulcers, a reminder that negative stools are not a reliable criterion of the absence of amoebic infection It is added that in this series of investigations, in 57 different tests amoebae were found in the scrapings, but not in stools, on 45 occasions on 10 occasions they were found in both stools and scrapings and in two in stools, but not in scrapings

The Committee concludes, as a result of this investigation, that chlorobexol is not an effective amoebicidal agent and that the results of treatment with it are markedly inferior to those obtained with either emetine or diodoquin separately

H J O'D Burke-Gaffney

SCHNEIDER, J & MONTÉZIN, G *Amibiase expérimentale et amibiase spontanée du rat [Experimental and Spontaneous Amoebiasis in the Rat]* *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 521-5

The authors, recognizing the limitations of the *in vitro* methods of testing amoebicidal drugs, have sought a good experimental host They believe the

kitten, although unresponsive to emetine to be the most suitable for difficulties, chiefly of supply prevented large-scale use of this animal. They therefore followed the experimental procedure of JOYNS (this *Bulletin* 1947 v 44 713) who used young rat weighing 20 to 33 gm for the evaluation of amoebicidal drugs after intracaeal inoculation of *E. histolytica* from cancer material. Like the original and other authors they found that the resulting infections were very variable as a result of this procedure. The amoebae present at autopsy could not be cultured in the usual media employed (a common experience with *E. muris*) cysts were rare and vegetative forms were seldom present in the rat faeces. These facts led them to doubt the nature of the infection and to suggest that the amoebae present were *E. muris* naturally infect the rat. A systematic survey of rats of different ages for the presence of natural infections with *E. muris* was carried out and the authors found that the distribution corresponded as regard age with that of amoebae in rats experimentally infected by the above procedure (older age groups are refractory). They quote inaccurately the results of HILTON & JOYNS (11 *Bulletin* 1948 v 45 430) who carried out a similar survey in a number of laboratory rodents because of the widespread occurrence of natural amoebic infections in rats used for chemotherapeutic test and adduce the evidence of these authors in further support of their own observations. It is not stated in the paper whether staining methods were used to determine the nature of the amoebae present in the rat gut. The authors' evidence that they were indeed *E. muris* is not convincing. While JOYNS in the paper quoted, made no mention of a natural amoebic infection in rat he did distinguish by staining methods the presence of *E. histolytica* in gut tissues. Vegetative forms and occasionally cysts, of this organism were sometimes present in rat faeces in the early stages of infection. The infection could not, however be regularly detected by examination or culture of the rat faeces. In a subsequent paper STEWART and JOYNS (this *Bulletin* 1948 45 1001) stated that one or more species of amoebae were sometimes present in the rat caecum and that there was no evidence that the experimental infections coincided with a natural infection. They were able to culture the amoebae present.

J. D. Fulton

LAMY, L. Le problème de la culture pure des amibes parasites. *Paris Culture of Parasitic Amoebae. C.R. Soc. Biol.* 1948 M v 147 Nos 9 10 633-4

Hitherto all attempts to grow the human intestinal amoeba, especially *Entamoeba histolytica* in pure culture, & in the absence of accompanying bacteria, have failed. The author has made an indirect approach to this question working with *E. muris* the pathogenic representative which can be cultivated at 25°C and is generally more amenable to experimental manipulation. It was hoped that results obtained with this amoeba would help to solve the problems of growing pure cultures of *E. histolytica*.

With the aid of de Fontbrune's micromanipulator a culture of *E. muris* associated with a single raphidococcus in media consisting of 10% of inspissated horse serum covered with a mixture of Ringer's solution and horse serum (6:1) with the addition of rice starch, small pieces of liver and a small amount of ground chick embryo. The sterility of the medium was controlled by broth cultures. The raphidococcus was eliminated from the pure mixed culture with *E. muris* by adding penicillin to 1000 units per cc. Up to the present the author has succeeded in obtaining several subcultures of the amoebae which were bacteriologically pure.

C. A. Hewitt

BARKSDALE, W L & ROUTH, C F *Isospora hominis* Infections among American Personnel in the Southwest Pacific *Amer J Trop Med* 1948, Sept, v 28, No 5, 639-44 [15 refs]

In the course of routine stool examinations in the South-West Pacific war area, the authors discovered 50 cases of infection with *Isospora hominis* among Americans, of whom 5 were from New Guinea, 5 from Leyte, 39 from Luzon and one from Japan. The Luzon cases represented 1.65 per cent of the persons examined (2,000 troops), including 16 found among 270 individuals belonging to one regiment. *Coccidia* were not detected in 750 Filipinos examined or in over 17,000 Japanese on Honshu.

The course of coccidiosis was followed in 15 patients kept under observation for 24 days. The symptoms ranged from slight intestinal disturbance to seizures with cramping, nausea and diarrhoea. The blood picture was normal, except for an eosinophilia of about 9.5 per cent. The oöcysts of *Isospora* were discharged in the stools cyclically, at irregular periods which lasted several days. When kept at 85-90°F the oöcysts underwent sporogony and matured in 48 hours.

No attempt was made to treat the disease, which is self-limited, but it was found that drugs used for concomitant disorders (tetrachlorethylene, emetine, carbarsone, chiniofon, diodoquin and atebirin [mepacrine]) had no action upon the coccidia, which continued to produce oöcysts. C A Hoare

MATSUBAYASHI, H & NOZAWA, T Experimental Infection of *Isospora hominis* in Man *Amer J Trop Med* 1948, Sept, v 28, No 5, 633-7, 2 figs

Human infections with *Isospora hominis* have been reported from Japan on six occasions since 1939. In two cases the infection was acquired in China, while the remaining four were of local origin. They were characterized by diarrhoea and various abdominal symptoms, without a rise of temperature. In order to observe the course of the disease, experimental infections of two volunteers were carried out, with oöcysts obtained from two different cases. The oöcysts were first washed by centrifugation and kept for more than 72 hours at 28°C, until sporogony was completed.

In the first experiment, a volunteer (one of the authors) ingested about 3,000 oöcysts. Eight days later symptoms of diarrhoea developed and there was a rise of temperature, the febrile condition lasting ten days, with temperatures above 39°C. On the following day the diarrhoea subsided but later the symptoms returned and were especially pronounced on the 17th day of the infection, after which they disappeared completely. Starting from the 9th day of the infection oöcysts of *I. hominis* were discharged regularly for 32 days.

Thirty-three days after the cessation of oöcyst-production in this person, he and another volunteer swallowed about 2,500 oöcysts each. In the first volunteer no infection resulted, probably owing to immunity acquired in the course of the original infection. In the second volunteer the course of the disease was similar to that described above, but the symptoms were more severe and oöcysts were discharged in the stools for six days longer. In both cases the symptoms disappeared without treatment after termination of oöcyst production. C A Hoare

COCKBURN, T A *Balantidium* Infection associated with Diarrhoea in Primates *Trans Roy Soc Trop Med & Hyg* 1948, Nov, v 42, No 3, 291-3

[A most interesting account] In June, 1947, at the London Zoological Society's Gardens a *Macaca nemestrina* (pigtail monkey) suffered from

kitten, although unresponsive to emetine to be the most suitable for difficulties chiefly of supply prevented large-scale use of this animal. They therefore followed the experimental procedure of JONES (this Bulletin 191 v 44 313) who used young rats weighing 20 to 33 gm. for the evaluation of amoebicidal drugs after intracæcal inoculation of *E. histolytica* from culture material. Like the original and other authors they found that the resulting infections were very variable as a result of this procedure. The amoebæ present at autopsy could not be cultured in the usual media employed (a common experience with *E. muris*) cysts were rare and vegetative forms were seldom present in the rat faeces. These facts led them to doubt the nature of the infection and to suggest that the amoebæ present were *E. muris* which naturally infect the rat. A systematic survey of rats of different ages for presence of natural infections with *E. muris* was carried out and the authors found that the distribution corresponded, as regards age, with that of amoebæ in rat experimentally infected by the above procedure (older age groups are refractory). They quote inaccurately the result of FULTON & JOYNER (this Bulletin 1918 v 45 430) who carried out a similar survey in a number of laboratory rodents because of the widespread occurrence of natural amoebæ infections in rats used for chemotherapeutic test and adduce the evidence of these authors in further support of their own observations. It is not stated in the paper whether staining methods were used to determine the nature of the amoebæ present in the rat gut. The authors' evidence that they were indeed *E. muris* is not convincing. While JONES in the paper quoted, makes no mention of a natural amoebic infection in rat, he did distinguish by staining methods the presence of *E. histolytica* in gut tissues. Vegetative forms and occasionally cysts of this organism were sometimes present in rat faeces in the early stages of infection. The infection could not however be regularly detected by examination or culture of the rat faeces. In a subsequent paper STEWART and JONES (this Bulletin 1948 v 45 1001) stated that one or more species of amoebæ were sometimes present in the rat caecum and that there was no evidence that the experimental infection coincided with a natural infection. They were able to culture the amoebæ present.

J. D. Fulton

LAURE, L. Le problème de la culture pure des amibes parasites. *Pure Culture of Parasitic Amoebæ.* C.A. Soc. Biol. 1948 May v 147 No. 9 10 633-4

Hitherto all attempts to grow the human intestinal amoebæ (especially *Entamoeba histolytica*) in pure culture, in the absence of accompanying bacteria, have failed. The author has made an indirect approach to this question working with *E. mædis*, the pathogenic reptilian parasite which can be cultivated at 35°C and is generally more amenable to experimental manipulations. It was hoped that results obtained with this amoeba might help to solve the problem of growing pure cultures of *E. histolytica*.

With the aid of de Fonbrune's micromanipulator a culture was obtained of *E. mædis* associated with a single staphylococcus in media consisting of a slope of mepesinated horse serum covered with a mixture of Ringer's solution and horse serum (1:1) with the addition of one starch granule per 4 gms. liver and a small amount of ground chick embryo. The survival of the amoebæ was controlled by broth cultures. The staphylococcus eliminated from the pure mixed culture with *E. mædis* by adding penicillin or chloroform (1:1000 units per cc.) up to the present the author has succeeded in obtaining serial subcultures of the amoebæ which are bacteriologically sterile.

C. J. Huxley

BARKSDALE, W L & ROUTH, C F *Isospora hominis* Infections among American Personnel in the Southwest Pacific *Amer J Trop Med* 1948, Sept, v 28, No 5, 639-44 [15 refs]

In the course of routine stool examinations in the South-West Pacific war area, the authors discovered 50 cases of infection with *Isospora hominis* among Americans, of whom 5 were from New Guinea, 5 from Leyte, 39 from Luzon and one from Japan. The Luzon cases represented 1.65 per cent of the persons examined (2,000 troops), including 16 found among 270 individuals belonging to one regiment. Coccidia were not detected in 750 Filipinos examined or in over 17,000 Japanese on Honshu.

The course of coccidiosis was followed in 15 patients kept under observation for 24 days. The symptoms ranged from slight intestinal disturbance to seizures with cramping, nausea and diarrhoea. The blood picture was normal, except for an eosinophilia of about 9.5 per cent. The oöcysts of *Isospora* were discharged in the stools cyclically, at irregular periods which lasted several days. When kept at 85-90°F the oöcysts underwent sporogony and matured in 48 hours.

No attempt was made to treat the disease, which is self-limited, but it was found that drugs used for concomitant disorders (tetrachlorethylene, emetine, carbarsone, chiniofon, diodoquin and atebum [mepacrine]) had no action upon the coccidia, which continued to produce oöcysts. C A Hoare

MATSUBAYASHI, H & NOZAWA, T Experimental Infection of *Isospora hominis* in Man *Amer J Trop Med* 1948, Sept, v 28, No 5, 633-7, 2 figs

Human infections with *Isospora hominis* have been reported from Japan on six occasions since 1939. In two cases the infection was acquired in China, while the remaining four were of local origin. They were characterized by diarrhoea and various abdominal symptoms, without a rise of temperature. In order to observe the course of the disease, experimental infections of two volunteers were carried out, with oöcysts obtained from two different cases. The oöcysts were first washed by centrifugation and kept for more than 72 hours at 28°C, until sporogony was completed.

In the first experiment, a volunteer (one of the authors) ingested about 3,000 oöcysts. Eight days later symptoms of diarrhoea developed and there was a rise of temperature, the febrile condition lasting ten days, with temperatures above 39°C. On the following day the diarrhoea subsided but later the symptoms returned and were especially pronounced on the 17th day of the infection after which they disappeared completely. Starting from the 9th day of the infection oöcysts of *I. hominis* were discharged regularly for 32 days.

Thirty-three days after the cessation of oöcyst-production in this person, he and another volunteer swallowed about 2,500 oöcysts each. In the first volunteer no infection resulted, probably owing to immunity acquired in the course of the original infection. In the second volunteer the course of the disease was similar to that described above, but the symptoms were more severe and oöcysts were discharged in the stools for six days longer. In both cases the symptoms disappeared without treatment after termination of oöcyst production. C A Hoare

COCKBURN, T A *Balantidium* Infection associated with Diarrhoea in Primates *Trans Roy Soc Trop Med & Hyg* 1948, Nov, v 42, No 3, 291-3

[A most interesting account] In June, 1947, at the London Zoological Society's Gardens a *Macaca nemestrina* (pigtail monkey) suffered from

weakness, wasting and loose motions and a heavy infection with *Balantidium* was found. Mepacrine 0.1 gm. daily was given with temporary success but with some difficulty and carbarsone 0.26 gm. b.d. was substituted, in tablet and was eaten greedily with excellent results. Though no *Balantidium* was seen after 3 days treatment was continued for 12 days.

Examination of 45 Primates in the monkey house discovered 8 infected four had had diarrhoea for some months. Small animal were given carbarsone in the same dose as the petal monkeys, the larger ones double this dose, and the diarrhoea ceased in 24 hours. Symptomatic carriers were not treated. Three weeks later some of the latter developed the diarrhoeic symptoms, as did also 3 Drills (*Mandrillus leucophaeus*) 3 *Macaca nemestrina* a *Cercopithecus* and a *Cer. opellaeus*. Again carbarsone cured the symptoms in 24 hours. The mode of spread could not be determined with certainty. In the monkey house cases occurred in all parts and not in adjoining cages. Spread may have been by flies. Crab-eating monkeys, *Macacus irus* were not infected, nor the chimpanzees but the latter are isolated behind glass. (The author wisely calls his article *Balantidium* infection associated with diarrhoea [or itches] not "caused by" but the protozoan was probably causative since if usual causes dietetic, helminthic and bacterial were excluded.)

H. H. S. S. S.

RELAPSING FEVER AND OTHER SPIROCHETOSSES

ROUSSELLOT R. & DOVOLOX RAYN S. Mire. Sur une souche de spirochètes isolée d'une gerbille iranienne *Tatera indica*. A strain of Spirochaetes isolated from a Persian Gerbil, *Tatera indica*. B. H. Soc. Path. Exot. 1948 v. 41 No. 7/8 453-63

A gerbil caught in the neighbourhood of Teheran and splenectomized, died of an intercurrent infect in fourteen days later. The inoculation of an emulsion of the heart, liver and kidneys of this animal into three splenectomized wild mice (*Mus musculus bactrianus*) was followed in them by the appearance of spirochaetes in the circulation after incubation periods of eight or nine days. Two white rats, one splenectomized, were inoculated with the same material and one became infected after fourteen and the other after sixteen days. Attempts to infect guinea-pigs were negative but white mice were found to be very susceptible with a mortality of more than 50 per cent. Normal rats were not readily infected but developed a latent infection which could be detected by inoculation of the brain into mice.

Attempts were made to cultivate the spirochaete in fowl embryos. Eggs were inoculated after 7 days incubation and examined a week later when the blood of the embryos was found to be swarming with spirochaetes. After three passages in eggs the organisms were still virulent to mice after six passages the results were negative.

The results of cross-immunity experiments show that this strain is distinct from *Spirochaeta duttoni* but whether it is related to *S. muris* found by Ratti in Persian field voles (see this Bulletin 1947 v. 44 87) or to other strains has not yet been determined.

E. H. S. S.

LEPROSY

INNES, J R Leprosy in Uganda *East African Med J* 1948, Oct, v 25, No 10, 379-81, 1 map

The author refers to visits to Uganda by COCHRANE and by MUIR and quotes the former's estimate of leprosy in that country as being 20,000, or 5.4 per thousand of the population

The present author has recently examined 14,808 people in Uganda and found an incidence of leprosy of 5.4 per thousand, and he estimates the present number of cases in the whole country as being 100,000. The survey is incomplete, but there is a definite impression that the final figure will be higher than that of Cochrane

It was possible to examine population samples of 500 or over in areas throughout the country. Co-operation by the people was very satisfactory and the author points to its importance

Results are shown in a map, in a table of area incidence and in a detailed list of the numbers examined in each place, which varied from 114 to 1,530. The highest incidence was around Fort Portal, Masindi and Arua, in which areas it averaged 11.7 per thousand. The lowest figures were 6 per thousand in the Entebbe, Masaka and Kampala area and 1.9 per thousand in the Sese Islands

It is noted that lepromatous cases varied from 15 to 20 per cent. No case seen was under regular treatment. (There are 4 leprosy institutions in Uganda and cases treated by them and other agencies are stated not to exceed 3,000.) No tribe was found exempt, but incidence was heaviest near the Congo Border and less near the Sudan. Segregation is rare (though it appears to have been practised rigidly in the past) and many children are left in house contact with cases of leprosy. Many other diseases were prevalent among those examined and other skin diseases cause diagnostic confusion. Housing is inadequate to prevent the spread of leprosy and the decline in prevalence must partly depend on adequate accommodation with a high amount of cubic space per person. Dietary standards vary greatly and were not correlated significantly with leprosy. The high average humidity over most of the country favours a severe type of the disease; in the few dry areas it is mild and rare. Environmental factors, communications and greater movements of people seem to be aiding a slow increase in leprosy in Uganda. *H J O'D Burke-Gaffney*

MUIR E Leprosy in the British West Indies *Leprosy Review* 1948, Oct, v 19, No 4, 139-42

This is a report on a visit during 1948 to the West Indies. Leprosy is a major problem in Trinidad and British Guiana, with about 1,000 cases in each, but less important elsewhere. On visiting the Trinidad leprosarium after three years the author found that under sulphone treatment lepromatous ulcers had nearly disappeared and that lepromatous cases were progressing towards recovery; these would otherwise have reached a hopeless stage. Good results were also observed in Jamaica, with arrest of eye lesions. In British Guiana and elsewhere similar results had been obtained.

Control in the smaller islands was slight because the small numbers isolated do not permit proper care, on financial grounds, so a new policy is advised in their case, namely the abolition of leprosy asylums and trusting to the attractions of present-day treatment in the place of compulsion. For this purpose two of the medical staff of each island should be trained in carrying out the treatment at a suitable centre; they would then be responsible for effective prophylaxis and treatment in their own areas. All immigrants from endemic

countries and contacts should undergo periodic examination and receive instruction on the dangers of infection to others. Such measures are only advised where the incidence is slight, as being more effective and less expensive under such conditions than compulsory isolation.

L. EYRE

Row R. Further Observation on Symbiosis of Microorganisms in Culture with special reference to *Mycobacterium* in Leprosy. *Indian Physician*, 1948, Oct., v 7 No 10 235-8, 4 figs. (3 coloured) on 7 pls.

The author first states that he has confirmed his isolation in pure culture of acid fast bacilli from leprosy lesions in symbiosis with *Leishmania* organisms [see this Bulletin 1946, 43 1147]. He goes on to report attempts at its symbiosis with other non-pathogenic acid fast bacilli. For this purpose he planted in haemoglobinized saline a few drops of fluid from a leproma, together with a trace of a non-leprosy acid-fast bacillary culture and obtained a mixed growth of long and short acid-fast bacilli forming heaped-up orange-coloured colonies like those of the tubercle bacillus. As it was found to be very difficult to separate the two forms, he cultivated the tubercle bacillus itself in a layer of Sauton nutrient fluid in a flask and introduced into the flask a sterile Pasteur Chamberland filter bougie containing a small fragment of the spleen of a mouse well infected with rat leprosy bacilli so that the diffusible substances generated in the flask by *Mycobacterium tuberculosis* could reach the rat-leprosy bacilli within the bougie without the latter organism being contaminated. After four weeks at 37°C. the sparingly distributed longish acid-fast bacilli within the bougie were planted out on glycerinated potato and on Sauton culture fluid for control. After eight weeks a small yellow patch developed on the potato surface as a pure culture of an acid-fast bacillus, now perhaps a little shorter than the original. A control test showed the bougie to be bacteria-proof. The author concludes that acid fast *Mycobacteria* can be isolated in culture by symbiosis of leprosy material with culturable micro-organisms whether they are micro-bacteria or proteus in culture makes no difference. How far the cultures thus isolated by symbiosis from the spleen of a mouse infected with rat leprosy bacilli as also those isolated from human lepromata and rat leprosy by symbiosis with proteus will satisfy Koch's postulates is left for future investigation.

L. Rogers

LOWE J. COCHRANE R. G. FITZ G. L. FIDANZI, E. P. DIAMOND JRA.
The Evolution of Leprosy and Leprosy Control. Correspondence. *Leprosy Review* 1948, Oct. v 19 No 4 143-54 (14 ref.)

This correspondence records the opinions of several experts on the vexed question of the evolution and control of leprosy and is designed to bring out the present confusion due to various classifications of the disease. Lowe maintains that changes from the tuberculous to the lepromatous form are extremely rare but in some cases mixed histological changes are seen. These lesions have a tendency to become lepromatous with negative lepromin reaction. COCHRANE states that "to base the diagnosis of a tuberculous lesion mainly on histology will lead to gross errors." He also has adherence to the current classification. He also holds that there are two clinical types of tuberculous leprosy with well-defined lesion and healing in the centre and (2) with less distinct borders, irregular edges, frequent reactions and a tendency to become lepromatous with negative lepromin reactions. The latter should be classed as borderline or indeterminate cases. FITZ writes on his experience at Carville (U.S.A.) where he has seen both tuberculous and lepromatous appearances together in the same patient and thinks that they may develop in either direction. He suggests that in each

cases the immunological status may be ill-defined, with some admixtures of types, but as they grow older the lesions become fixed to one type or other. More histological studies of the evolution of early cases are required. FIDANZA of Argentina thinks that the disease always begins as an undifferentiated simple inflammatory lesion and the later development depends on the degree of resistance. The lepromin test provides a valuable aid to classification, the most frequent change being that from a negative lepromatous to a positive reaction after prolonged energetic treatment. No type is immutable, but a direct change from one polar type to another is a rare exception. Dr DHARMENDRA from his Calcutta studies concludes that a change from tuberculoid to lepromatous type is rare and that the confusion is due to two different interpretations being given to the term tuberculoid, which should be restricted to cases showing only typical tuberculoid histological changes.

L. Rogers

LOWE, J. Sulphone Treatment of Leprosy. *Leprosy Review* 1948 Oct, v 19, No 4, 129-38 [18 refs.]

ALDERSON, S. Physical Therapy in Leprosy. *Leprosy Review* 1948, Oct, v 19, No 4, 120-29

This paper deals with the physical treatment of crippled nerve cases in Nigeria by a B.E.L.R.A. worker, this has hitherto been neglected in British tropical countries, although these constitute a large proportion of advanced leprosy cases in which drugs have little place. In two-thirds of the patients, both arms are usually affected and at the Uzuakoli settlement 378 of 673 examined showed such lesions. Trophic changes were especially common in children, but many of the cases at all ages were in a fairly early stage with only slight wasting. Exercises are of great value in such cases, for the details of these the original paper should be consulted and also for simple forms of apparatus which have been found useful. Heat treatment is also useful and is best applied by means of baths of heated hydnocarpus oil, followed by massage for five to fifteen minutes, consisting of effleurage, kneading and friction applied to the whole hand and later to the ulnar border of the forearm. Active finger exercises follow. Suitable patients were trained to assist in carrying out the treatment after a European expert had examined the patients and given written instructions for it.

Occupational therapy by means of a specially designed simple hand loom proved effective especially in children, who co-operated best. Illustrative cases of the benefits are given. Exercises, based on notes by Dr RYRIE, for both hands and feet proved of value. When an affected nerve is acutely painful, injection therapy or an operation should precede physical therapy.

L. Rogers

HELMINTHIASIS

COWPER, S. G. The Effect of certain Inorganic and Vegetable Substances on the English Pond Snail *Planorbis corneus* (Linné, 1758). *Ann Trop Med & Parasit* 1948, Sept, v 42, No 2, 119-30 [20 refs.]

The author tested the comparative molluscicidal effects of a variety of substances by exposing the English pond snail, *Planorbis corneus*, to them in various dilutions and for various durations.

After a review of part of the literature dealing with snail control with special reference to use of copper the results of tests with certain copper salts are described and tabulated. Copper acetate killed snails in 48 hours at a dilution of 1 p.p.m. copper chloride at 5 p.p.m. in 74 hours the less soluble copper carbonate was toxic at 5 p.p.m. It is remarked that *P. ovum* appeared to be more resistant than *Balanus* and *Physopsis* to copper salt judging by comparison with previous workers' results.

A series of eight different copper ores was also tested against *P. ovum*. These were ground up and samples of 5 gm. were suspended in paraffin-oil bags in the vessel containing the live snails. The best result was obtained with ores containing malachite which proved toxic to snails at a dilution of 1.25 gm. per litre. The toxic effect of ores is much less than that of the soluble copper salts, but they are thought to justify further trials in the field.

Extracts and preparations of a number of tropical plants were obtained mainly by boiling the leaves and the filtered liquids were tested against *P. ovum*. The action of extracts of *Eucalyptus* and *Sapindus* was almost negligible. In *Balanus Randi* and *Quillaja* a molluscicidal principle was demonstrated while extracts of *Tephrosia* leaf were effective only in high concentrations over long periods. The effects of saponin (Merck) were variable and in high dilutions had only a slight toxicity to the snails.

J. J. C. DE VEE

KIRKALDY WILLIS W. H. Cystoscopy in the Diagnosis and Treatment of Bilharzia Haematobium Infection. *East African Med. J.* 1948, Sept. v. 23 No. 9 333-61 13 coloured figs. on 3 pls. 89 refs.

The author since 1911 has been interested in cystoscopy in East African hospital practice. He has endeavoured to determine the value of this procedure in the diagnosis of urinary schistosomiasis and its differentiation from the changes in the bladder resultant on other forms of urogenital disease. He lists in considerable detail with illustrative cases the cystoscopic changes observed in Kenya Africans (*Algeriama* tribe) suffering from urinary schistosomiasis and from a wide variety of other bladder conditions. Cystoscopy he concludes is indispensable in the diagnosis and as a control after the treatment of urinary schistosomiasis.

[This paper does not lead itself to summary. It contains a great amount of information, ranges over a very wide field, and the references are numerous. It should be consulted in the original by those interested.]

A. R. D. ALLEN

GELFAND M. The Diagnosis of Schistosomiasis. *East African Med. J.* 1948, Sept. v. 23 No. 9 367-71 13 refs.

A conclusive diagnosis of schistosomiasis is dependent on recovery of the ova of the parasites in many cases this is difficult. The intradermal test for diagnosis is not specific, and both false positive and false negative reactions are common. Eosinophilia is of inconclusive value in diagnosis as is the Karmoljagi test.

Schistosomiasis due either to *S. haematobium* or *S. mansoni* should be suspected in those who have been at risk of infection and complain of constitutional symptoms—loss of weight and appetite, dyspepsia, turbid urine, flatulence, debility, inability to concentrate and cough—even in the absence of the classical manifestations of the disease. Examination of single specimens of urine or of stool for ova is usually inadequate; repeated examination may be necessary to reveal the characteristic changes occurring in the specimens.

and to demonstrate the presence of ova *S. mansoni* ova, in Southern Rhodesia, have been found in rectal biopsy snippings in sixty per cent of those passing eggs in the stools. In some cases of negative stool examination a diagnosis has been established by biopsy. Negative rectal snips and repeated stool examinations indicate reasonably conclusively an absence of *S. mansoni* infection. *S. haematobium* ova will not infrequently be found in rectal snippings, either alone or in association with those of *S. mansoni*, but they are very rarely found in the stools. Forty per cent of cases of *S. haematobium* infestation yield positive rectal biopsies.

Cystoscopy is of value in the diagnosis of urinary schistosomiasis. Even in the absence of visible abnormality (30 per cent of cases) bladder biopsies yield *S. haematobium* ova in a high (90 per cent) proportion of all cases of *S. haematobium* infection. *S. mansoni* ova are very rarely seen on bladder biopsy.

Radiography is a rather neglected method of diagnosis in urinary schistosomiasis. In 15 per cent of Africans [with *S. haematobium* infection] calcification in the bladder can be seen. The shadow is usually linear; it may be short, narrow, and faint, or it may be a complete circle resembling a foetal skull. In addition to the linear outline calcified striations or irregular calcified masses may be seen. In a small proportion of cases the ureter, especially in its lower third, can be seen outlined. In Europeans radiographic changes are far less evident, possibly owing to their lighter infestations.

Intravenous pyelography is of limited value and should be reserved for those cases with suspected ureteric complications; in these it may be found that the ureter is tortuous, elongated, and dilated, usually in its lower half.

I R D Idams

GELFAND, M. The Diagnosis of Schistosomiasis In Southern Rhodesia by the Rectal Biopsy Technique. *Trans Roy Soc Trop Med & Hyg* 1948, Nov., v 42, No 3, 283-6

The author discusses the various methods of diagnosis of intestinal schistosomiasis and refers at some length to the literature on the subject, especially in regard to the development of the technique of rectal biopsy. All the papers quoted have been abstracted in this *Bulletin*.

He then gives his own recent experiences with the use of rectal biopsy in the case of young adult Africans in Salisbury, Southern Rhodesia. The cases were divided into (1) those passing *S. mansoni* ova in the stools, but no *S. haematobium* ova in the urine; (2) those passing *haematobium* ova in the urine, but no *mansoni* ova in the stools, and (3) those showing no ova on microscopical examination of stool and urine (usually only one specimen of each was examined).

The patients were prepared as for sigmoidoscopy, with a saline enema (1 pint) beforehand. This rendered examination much more simple. After insertion of the sigmoidoscope a snip was taken from the first right dorso-ventral valve. The instrument was passed to the second valve of Houston and another snip taken from there. Finally, one or two snips were taken from between the two regions, generally from a haemorrhagic focus or other suspicious area. Bleeding was slight, but the snip was somewhat painful at the time. The snippings, which were only about 2 mm in size, were teased in water on a slide and examined with a low-power objective.

While the author did not obtain as high a percentage of positive results for *S. mansoni* in the rectum as did other workers, ova were found in most patients passing them in the stools and even in those passing no ova of any kind either in stool or urine. Nevertheless, stool examination should not be omitted, as even when ova are passed, biopsy may be negative.

An interesting feature was the finding of *S. haematobium* ova in rectal snippings alone or with *S. mansoni*. The author points out that ova of *S. haematobium* are often deposited in tributaries of the inferior haemorrhoidal vein. They do not always appear in the stool but have been reported not infrequently (see this Bulletin 1937: 1: 34-39). In the author's own experience less than 3 per cent. of those harbouring *S. haematobium* pass ova in the stool. He has, however, found ova of this species in 77 digested rectal specimens from 107 cases proved at autopsy to have vesical schistosomiasis. It is thus not surprising that these ova may be found in rectal snippings in cases of urinary schistosomiasis.

In the present series the author found ova in rectal snippings of 72 of 28 patients in group (1) above. 17 showed *S. mansoni* ova alone, 8 were dual infections and 7 were *haematobium* alone.

Fifteen patients in group (2) revealed 7 infections of ova in the snippings, all contained *S. haematobium* ova and two also contained *S. mansoni* ova.

Of 18 patients in group (3) 7 showed ova in the snippings, two were *S. mansoni* and five of *S. haematobium*.

The author considers that the biopsy technique is of added value in areas such as Rhodesia where both types of schistosome infection are present, or also GELF in this Bulletin 1939: 46-56. H. J. O'D. Brien-Gibney.

PIRAXO C. F. La infección unisexual producida por *Schistosoma mansoni* en condiciones experimentales. Unisexual Infection in Experimental Schistosomiasis *mansoni*. Archivos Venezolanos de Patol. Trop. y Parasit. Méd. 1938 Jan. 1: No. 1: 63-72. 11 ref. English summary.

It has often been reported and even confirmed experimentally that all the schistosome cercariae coming from a single miracidium are of the same sex. The author used for his experiments white mice and cercariae from *A. glabratus*, the intermediate host of *S. mansoni* in Venezuela in the dry season. He infected 96 animals, exposing them to 18 of these snails and later found 20 ova in the liver, 590 males in the portal veins, 72 of which mirrored sex otherwise no females. It is argued from this that larval form potentially masculine are more resistant during the dry season and that human infections acquired at such season are due to larvae predominantly of male sex. At 20 of these animals were subjected to infection in 10 snails taken from the rainy season. When examined later the liver was crowded with ova in the portal vessels were 205 males, 187 females and 16 not determined. Infection analogous to the above would be that the rainy season favours the production of larvae potentially female and that human infections acquired at such time likely to be both male and female.

The experiment was then carried a stage further. 1 animal was infected to cercariae from *A. glabratus* collected during the rainy season. At five when examined later showed many ova in the portal vessels. 4 male and 1 female worms in the portal vessels, altogether 14 males, 14 females, 120 not determined. Four animals were then subjected to infection in snails of the same batch which had been in the water at the same time as the first during which the volume of the fluid containing them had increased half by evaporation. When examined later one of the animals had ova in the liver, the other three had none. The first had 42 males and 10 females in the portal vessels, the other 23, 47 and 28 males respectively and no females. A study of much interest. H. H. W. J. O'D.

JAFFÉ, R Anatomia patologica y patogenia de la bilharziosis mansoni en Venezuela [The Pathogeny and Morbid Histology of Infestation by *Schistosoma mansoni* in Venezuela] *Archivos Venezolanos de Patol Trop y Parasit Méd* 1948, Jan, v 1, No 1, 32-62, 29 figs [33 refs] English summary

The author describes in minute detail the pathological anatomy and histology of the lesions produced in the different organs and tissues by the presence of *S. mansoni* and its ova—in the liver, the lungs, the myocardium, etc—and these are well shown in a series of photomicrographs. These are described in all reputable textbooks on tropical medicine and pathology and the knowledge is common to readers of this *Bulletin*.

In his discussion of the pathogeny the author breaks new ground. There is the local inflammatory reaction due to the presence of ova, but in addition there is a tissue reaction against toxic excretions of the parasite or its eggs, direct or by way of allergy, and this last may arise from allergy to the parasitic toxins or to products of the injured tissue. The myocarditis is thus attributed, and the cirrhosis of the liver, apart from the more localized pipe-stem cirrhosis, may be due to similar allergic reactions. Other lesions result from local accumulations of ova leading (in the intestine, for example) to necrosis and ulceration, but this seems to be uncommon in Venezuela, though reported as frequent in other countries. In Venezuela, the results in the large intestine are the production of a catarrhal condition with small haemorrhages.

H Harold Scott

MAYER, M Consideraciones sobre el tratamiento de la bilharziosis con preparados del antimonio (por las vias intravenosa, intramuscular, oral y rectal) [The Treatment of Schistosomiasis with Antimony, Intravenously, Intramuscularly, Orally and Rectally] *Archivos Venezolanos de Patol Trop y Parasit Méd* 1948, Jan, v 1, No 1, 120-43 [63 refs] English summary (4 lines)

The author introduces the subject by saying that his colleagues have asked for his opinion on the treatment of schistosomiasis by antimonials, so he is publishing observations based on what he has seen abroad. "It is not by any means my intention," he states, "to criticize the various forms of treatment adopted by medical experts." Then follows a discursive account of the use of antimony in tropical medicine. The first half deals with the use of tartar emetic in kala azar, the second reviews this salt, and foudrin and anthiomaline in the treatment of schistosomiasis. The opinions of more than 50 authors who have written during the past 30 years on the dosage and intervals between doses are quoted, but no original view is vouchsafed nor any account of original work.

H Harold Scott

ABDOU S & GRACE, H K Observations on the Late Results of Splenectomy for Bilharzial Splenomegaly *J Roy Egyptian Med Ass* 1948, Oct, v 31, No 10, 786-91, 4 figs & 1 map [11 refs]

Splenomegaly due to *Schistosoma mansoni* infection is common in Egypt. In 3 589 major operations performed at the Kasr El-Aini Hospital in the year 1936/37 there were 167 (4.65 per cent) splenectomies. In a village in Dakahlia province 344 persons between the ages of 8 and 20 years were examined for schistosomiasis and for splenomegaly, of these 269 (78 per cent) had schistosomiasis and 100 (29 per cent) had splenomegaly. Of the 100 with splenomegaly, 89 had schistosomiasis (84 *S. mansoni*, and 5 *S. mansoni* and *S. haematobium*), in the remainder no evidence of the infections was found. Treatment

with tartar emetic produced some shrinkage of moderately enlarged spleen and improvement in the general condition of these patients and the plasma from which some of them suffered disappeared as a result of it.

Observations were made on 42 patients splenectomized for splenomegaly from one year to 25 years previously (in 7 only of these cases was the diagnosis of schistosomiasis established microscopically). Thirteen of the patients were operated on by one of the authors, during the last 10 years of the 3 are still alive. Of the 5 that have died one died of portal thrombosis on the fourth day and four survived for two years after operation. Seven patients who had been operated on by other surgeons during the last 25 years are now dead. Of these one died recently of carcinoma of the liver 25 years after splenectomy. The general results of splenectomy were good: the splenomegaly and anemia from which the patients suffered disappeared and their nutrition and work capacity were restored; health was maintained in the absence of reinfection. The desirability of tartar emetic treatment in the early stages of splenomegaly is emphasized. It is important to give a course of tartar emetic treatment pre-operatively and re-treatment is necessary in the event of reinfection of individuals who have been splenectomized. A. R. D. (Lm)

BAUMAN, P. M., BENNETT, H. J. & INGALLS, J. W. Jr. The Molluscan Intermediate Host and Schistosomiasis japonica. II. Observations on the Production and Rate of Emergence of Cercariae of *Schistosoma japonicum* from the Molluscan Intermediate Host, *Oncomelania quadrasi* (Forst.). *Trop Med* 1948, July v 23 No 4 507-75 1 fig & 1 graph

"This investigation was conducted in order to obtain greater numbers of naturally shed cercariae for use in the laboratory of the Commission on Schistosomiasis in the Philippine Islands. The observations and experiments performed provided the following observations:

1. Alkaline water (optimum pH 7.6) was a critical factor in the natural release of cercariae of *Schistosoma japonicum* from the molluscan host *Oncomelania quadrasi* on Leyte.

2. Temperature variations of the water between 19 and 30°C. did not influence the release of cercariae from the naturally infected host *Oncomelania quadrasi*.

3. Artificial illumination and darkness were similarly unimportant factors; however the natural release of cercariae is of a definite nocturnal periodic nature. Cercariae were released in significant quantities throughout the early evening and continued emerging after midnight with the peak of production occurring from 9:00 to 11:00 p.m., steadily decreasing as daylight approached.

4. Naturally infected *Oncomelania quadrasi* will liberate cercariae on two to three successive nights and then an equally long period will pass before any considerable number of cercariae will emerge. Not a single known growth of *O. quadrasi* under observation for 30 days discharged cercariae continuously for more than three consecutive days thus indicating that the natural emergence of *S. japonicum* cercariae from the molluscan host is of a cyclic nature.

MAO, C. P. & LI, L. A Note on the Morphology of *Schistosoma japonicum*. *Proc Helminthological Soc of Washington* 1948, July 15 No 27 9 1 fig

As a result of the examination of several hundred adult *S. japonicum* including 15 Japanese and 8 Philippine specimens it is concluded that the length of the common caecum constantly occupies the posterior third of the body and the number of testes is invariably seven. Two exceptions in

the number of testes and several instances in peculiar morphology of the intestine are also reported"

ARENAS, R, ESPINOSA, A, PADRÓN, E & ANDREU, R M Fascioliasis hepática con carácter de brote epidémico [*Fasciola hepatica* Infestation as an Epidemic Outbreak] *Rev Kuba Med Trop y Parasit* Habana 1948, Apr-May, v 4, Nos 4/5, 92-7

In 1944 the authors were called upon to investigate cases of a disease characterized by digestive and hepatic symptoms accompanied by a high eosinophilia, occurring in San Cristobal, in the Province of Pinar del Rio. One doctor there had more than 40 such patients. Examination by the duodenal sound resulted in the finding of ova of *F hepatica*. The patients were accustomed to consume a good deal of watercress and examination of this showed the presence of *Physa cubensis* and *Lymnaea cubensis*, intermediate hosts of *F hepatica*.

Later, in 1947, in Pinar del Rio a "new disease" was reported the main symptoms of which were spasms of coughing and a high eosinophilia, thought to be due to filtrable virus. With assent of 20 local doctors, the authors went to the district with a view of seeing cases for themselves. The early symptoms were digestive and biliary, later pulmonary, cutaneous and nervous. They studied 52 patients. The usual history given was of pain in the abdomen, mostly in the epigastrium, with fever to 39-41°C, shivering and sweats, the pain persisted, with intermissions, for several days, the fever, shivering and sweating, worse in the afternoon and evening, also persisted, with remissions. Many complained of weakness, joint and muscle pains and allergic symptoms such as urticaria, pruritus and asthmatic attacks. Headache, insomnia, constipation and diarrhoea, together with a dry cough and a yellow discoloration of the skin were other symptoms, not always present.

Analysis of the cases showed that all the patients suffered from the abdominal pain in epigastrium or right hypochondrium, 45 had fever, intermittent or remittent, perhaps continuing for months, 43 had anorexia, 39 weakness more or less marked, 38 had enlargement of the liver, but not great except in a few. 33 had urticaria. Blood examination showed red cells between 3,200,000 and 5,140,000 per cmm with an average of 4,033,000, leucocytes ranged between the wide limits of 5,000 and 41,500, with an average of 16,500, eosinophiles might be as high as 81 per cent, but the average was 35. The duodenal sound was used in all 52 patients and ova of *F hepatica* were present in 22 of them, the amount of bile obtained being from 80 to 300 cc. Failure to find ova is ascribed, first, to the fact many were early cases and the parasites had not reached maturity, second, emetine hydrochloride had already been given. This had been done in nine patients. Forty-eight of the 52 owned to having eaten the suspected watercress.

H Harold Scott

KOURÍ, P Diagnóstico, epidemiología y profilaxis de la Fascioliasis hepática humana en Cuba [Diagnosis, Epidemiology and Prophylaxis of Infestation by *Fasciola hepatica* in Cuba] *Rev Kuba Med Trop y Parasit* Habana 1948, Apr-May, v 4, Nos 4/5, 77-87, 7 figs [52 refs]

Diagnosis of *Fasciola hepatica* infestation on clinical grounds is not very definite or conclusive, the symptoms of angiocholitis, and cholecystitis are common to bacterial infections of the bile-ducts and gall bladder and to gall-stones. Finding of the ova in the faeces is confirmatory, but they may be sparse and missed unless bile is obtained by the duodenal sound. Occasionally they are seen unexpectedly at operation or are not found until autopsy reveals

the presence of the worm. One symptom on which the author lays much stress is prolonged fever with high eosinophilia. Outbreaks of this have occurred in Pinar del Rio and La Villa. Laboratory diagnosis (apart from finding the ova in faeces or bile) includes biological reaction, intradermal reaction with extract of the trematode, precipitin test and de Wit's complement but these have not been long enough on trial to afford reliable results. The therapeutic test—the result of emetine treatment—is fallacious. Laccase is equally efficacious in amoebic hepatitis [see this Bulletin 1941 v. 25 no. 2].

Epidemiologically the Provinces of Pinar del Rio and Las Villas furnished most cases. Havana and Matanzas some but fewer. The author suggests the estimation of four indices for determining endemicity: 1. The *Hepatic Fasciola Index*—the percentage of slaughtered cattle found infected. 2. The *Ova-faeces Index*—the percentage of cattle passing the ova in manure and dairy herd, etc. 3. The *Malacological Index*—the percentage of *Pisum cubensis* and *Lymnaea cubensis* which act as intermediate host among the total snails and molluscs examined. 4. The *Cercarial Index*—the percentage of these intermediate host found infected with sporozoites (rediae and cercariae).

Prophylactic methods follow naturally from the foregoing and would comprise treating infected persons and cattle, boiling and filtering the drinking water, avoiding raw fruit and vegetables from infected regions, destruction of the intermediate snail hosts. The article has a bibliography of 52 references, 33 of which are by the author himself or with colleagues who have made fasciolosis in Cuba a special study. H. Harold Smith

Ledes, L. A. La *Railletomonis* es una endemia en el Ecuador. Nota apartada al conocimiento de la *Railletoma* (*Railletoma*) Equatoriana. [Identified by R. Kurius in Ecuador. Fresh Contribution on *Railletoma* equatoriana.] Bol. Su. Med. Quil Ecuador 1937 Jan. Feb. 3 No. 1, p. 41-9, 3 figs., 18 refs.]

There are several species of *Railletoma* which may infect man. *Railletoma madagascariensis* occurring not only in Madagascar but also in Sumatra, Borneo, Gambia, Formosa and the Philippines normally a parasite of birds. *Railletoma* (later named *Tricomicrifer*) found among children in Cuba, as two in Ecuador says the author, there are 6 or 7 species. Wherever he takes a new species. Their intermediate host is not yet determined, but may be small molluscs or beetles. They are common in the Province of Pichincha and they infect all races, white, coloured and half-caste, and adults. In children usually 6-8 worms are found in a patient. They set up gastrointestinal symptoms such as nausea, anorexia, colic and dysentery, or as a symptom headache, dulness, epileptiform or convulsive attack and changes of character and circulatory disturbances such as palmar anaemia sometimes with slight eosinophilia, precordial pain and arrhythmia. Treatment by Filix mas or by carbon tetrachloride gives good results in children.

The author gives a detailed description of the parasite. It is pear-shaped scolex, 500-700 μ by 400-500 μ with a characteristic arrangement of double row of hooklets at one end in number and 15-18 μ long, and 4-5 μ wide with an edging of three or four rows of small granular hooklets. The proglottides are nearly all broader than the length till the tail segments are reached. The genital pores are unilateral with a small one on the other side. The testicles are in number from 4 to 75 in all ages. The more or less solid ducts 0.5 mm with 20 μ diameter, possess an internal constriction, 10-20 μ most commonly eight. The uterus 10-15 μ long by 32-35 μ wide with two or three and very like the uterus of *Tricomicrifer*. H. Harold Smith

RISQUEZ-IRIBARREN, R & ORTIZ C, I Consideraciones con motivo del segundo caso de *Hymenolepis diminuta* en Venezuela [Remarks on the Second Case of Infestation by *Hymenolepis diminuta* in Venezuela] *Rev Policlínica Caracas* 1947, July-Oct, v 16, Nos 95/96, 201-14 English summary (7 lines) [32 refs]

In 1919 CUENCA reported that a child in Caracas, a patient of Dr Risquez, passed a worm which was identified as *H. diminuta*. This appears to have been the first recorded instance of this infestation in Caracas and that it is rare is evidenced by the fact that not until 1945 has another case been observed. This was in a child who was being treated for parasitism by *Ascaris*, *Trichuris* and *Necator*. The cestode passed was sent to the Smithsonian Institute at Washington where the diagnosis of *H. diminuta* was confirmed.

The remainder of the article consists of records by various authors who have examined faeces in considerable numbers during the past 25 years or so and the localities concerned, and gives in tabular form the numbers and percentages of *T. solium*, *T. saginata* and *H. nana* found—matters of local rather than of general interest.

H Harold Scott

HUNG, See-Lu & LI, Fei-Pai On the Egg Discrimination, Larval Culture and Infection Course of *Trichostrongylus orientalis* *Chin. Rev. Trop. Med.* 1948, Jan, v 1, No 1, 1-5, 1 fig

In 500 cases of ancylostomiasis which were diagnosed at Pehpei, the eggs of *Trichostrongylus* were found in 41 patients, all of whom were natives of districts in the lower valley of Fu-Kiang. A preliminary survey in these districts revealed a prevalent infestation with *Trichostrongylus*, ranging from 28.12 to 49.16 per cent. The abundant material provided by this survey enabled the authors to give a detailed account of the methods of differentiating eggs of *Trichostrongylus* from those of *Ancylostoma*, to devise a method of culturing *Trichostrongylus* eggs for the purpose of obtaining infective larvae, and to carry out experimental infections of rabbits with the larvae.

Measurements of 200 eggs of *Trichostrongylus* and *Ancylostoma* gave the averages $90.94 \times 45.12 \mu$ for the former and $64.89 \times 40.46 \mu$ for the latter. It is remarked that not only are the general dimensions different, but the length-width ratio is distinctive in the two species, for in 57.5 per cent of the *Trichostrongylus* eggs the length is twice as great as the width whereas in 100 per cent of *Ancylostoma* eggs the length is less than twice the width. Colour, shape, shell-thickness and degree of development of freshly-passed eggs are also contrasted.

A rather elaborate method of culturing faeces for infective larvae is described, which cannot be dealt with in detail in this abstract.

Experiments on the infection of rabbits with larvae of *Trichostrongylus* were carried out both orally and cutaneously. The oral method proved to be outstandingly the more effective of the two and it is suggested that human infection with *Trichostrongylus* may also be more readily incurred by oral ingestion of the larvae.

J J C Buckley

STRANG, C & WARRICK, C K Radiological Demonstration of *Ascaris* Infestation *Brit J Radiol* 1948, Nov, v 21, No 251, 575-8, 4 figs

For the diagnosis of ascariasis, radiography is seldom necessary, but it may be of value when for some reason, e.g. delayed parturition or the presence of male worms only, ova are absent from the stools. The worms are easily

demonstrable by serial radiographs of the abdomen at half-hour intervals. They may also be discovered accidentally during a barium meal examination for some other condition.

The radiological signs are (1) sharply defined band-shaped filling defects (2) linear shadows due to adherence of barium to the exterior of the worms (3) thread like shadows caused by the presence of barium in the enteric caeca of the worms and (4) evidence of disordered motility of the bowel.

The case of a ship's officer who stated that he had passed round worms in his stools is reported. He was symptom free and had no eosinophilia. Ova were found in his stools. Two courses of hexyresorcinol (1 gramme) followed in two hours by an ounce of saturated sodium sulphate on an empty stomach produced no worms. Two months later he still had ova in the stools. He was given 4 ml. of tetrachlorethylene and 1 ml. of oil of chenopodium after which he produced 5 dead larvae and subsequent stool examinations were negative.

He was examined radiologically before any treatment and after the hexyresorcinol. All the above-mentioned signs were demonstrated. At the second examination the worms were not demonstrated until the 5½-hour examination when a filling defect was observed in the ileum. At 6 hours barium was still adherent to the worms. [There are 4 very convincing illustrations of radiographs.]

J. E. Nafar

WILSON T. Bancroftia Filariasis. [Correspondence] The Roy Soc Trop Med & Hyg 1948 Nov v 42, No 3 305-8

This is a note in way of comment on Clayton LANK article this Bulletin 1948, v 45 887.

The author considers that conclusive proof of nightly parturition has yet to be found and that the facts could equally well be explained by the existence of a much longer period of gestation, expressed in days or even weeks but combined with a fair degree of synchronization between the adult worms and with expulsive parturition.

The evidence in favour of nightly birth and daily death of microfilariae is as yet not sufficiently conclusive.

The author notes that the youngest reported blood infection was a child of 14 months but he himself discovered a child of 13 months infected with W. malayi.

P. Marion Dale

MONTESTREUC E. A propos de l'index filarien à la Martinique (Il s'agit de la lymphangite endémique de pays chauds. The Filaria Index in Martinique (Il bancroftia) and Endemic Lymphangitis of Warm Countries.) Bull Soc Path Exot 1948 v 41, No. 3 6 372-3.

FLOCH and LAJOUX this Bulletin 1947 v 44 922 state that they cannot accept the filarial aetiology of tropical lymphangitis. This confirms with the present author's opinion expressed twelve years ago this Bulletin 1934 23 [27] in which he suggested that the filaria only plays a preparatory role by damaging the lymphatics.

The percentage findings in microfilaria surveys in various workers in Martinique through the last twenty-five years have been 5.47 in 1913, 37 in 1917, 18.6 in 1934, 1.75 in 1939 and 14.3 in 1945. It does not show the significance of these variations.

In the discussion Dr H. GALLIARD pointed out the fallacy of accepting the microfilaria index as evidence of the extent of filarial infection in a locality and quoted the American experience in which leprosy showed adult filaria in

many persons who had no microfilariae in their blood. The figures quoted above were also subject to variations of technique, to selection of population groups, and to the effects of patchy distribution.

On the subject of aetiology of lymphangitis of warm countries, he said it was not a question of being exclusively caused by bacterial infection or exclusively an allergic or a toxic manifestation—it was a question of the stage of development. The worm causes a loss of vitality of the local tissues and complications follow. It was possible that tropical lymphangitis was a distinct clinical entity, but that it was necessary to prove that no adult filariae were present; the absence of microfilariae was not sufficient. Again, it was a fallacy to suggest that because lymphangitis was uncommon in certain filaria-endemic areas it was not associated with filariasis. In different regions different clinical manifestations were found to predominate; this was possibly a human factor, as suggested by Buxton, or a parasitic one, there being different biotypes of filariae of which *W. malayi* was an example. L. E. Napier

STEFANOPOULO, G. J. & SCHNEIDER, J. Essais de traitement de la filariose à *F. loa* par la 1-diéthyl-carbamyl 4-méthylpipérazine [Treatment of *Loa loa* Infections with Hetrazan] *C. R. Soc. Biol.* 1948, July, v 142, Nos 13/14, 930-31.

Hetrazan (1-diethyl-carbamyl-4-methylpiperazine) has been used with success in the treatment of human filariasis (*Wuchereria bancrofti*) by SANTIAGO-STEVENSON and his colleagues [this *Bulletin*, 1948, v 45, 353]. The results obtained encouraged the authors to try this drug in filariasis due to *Loa loa*.

They used it (the citrate salt) in the treatment of 20 cases of *Loa loa* infection of variable duration and symptomatology. In three cases, the essential symptom was obstinate pruritus. There was always an eosinophilia, from 15 to 60 per cent. In seven cases, microfilariae were found in the peripheral blood and in all the other cases the clinical diagnosis was confirmed by the intradermal test. The patients were all adults.

The dosage given was 3 to 6 mgm per kilogramme body-weight, daily, by mouth, for 7 to 10 days. Within the first hours of treatment some subjects showed superficial reactions, a sensation of subcutaneous "creeping," temporary exacerbation of pruritus, or fugitive oedema, and in one case a generalized erythema. Rarely, there were a generalized reaction, nausea, arthralgia, diarrhoea and fever; all these reactions disappeared within 48 hours.

Within 48 hours all symptoms disappeared; in some cases, especially where there was pruritus, the improvement was spectacular. At the same time the microfilariae disappeared from the peripheral blood. In one case only were they found after 7 days of treatment. The worms tended to appear under the skin or mucous membranes (conjunctiva) and were sometimes eliminated spontaneously, or the dead worm formed a subcutaneous nodule without any oedema.

In some cases the symptoms disappeared for 2 to 4 months, but more often the improvement was transitory and after a few weeks of remission the symptoms returned in a less severe form. However, in nine cases it has been possible to effect an apparently complete cure by giving 2 to 4 courses of treatment of daily doses of 0.4 grammes for 10 days each, with intervals of 3 to 4 weeks between the courses.

The authors have had experience in the treatment of filariasis for 15 years, but this is the first drug that has given consistently good results.

L. E. Napier

TRENT Sophie C. Anthiomaline and Neostibosan in the Treatment of Filariæ (*Dirofilaria immitis*) Puerto Rico J. Pub. Health & Trop. Med. 1944 Mar., v 23 No. 3 311-60 3 charts & 1 fig. Spanish edition 319 [Refs. in footnotes.]

After treatment with anthiomaline a trivalent Sb compound reduction of disappearance of microfilariae in various filarial infections has been reported (this Bulletin 1940 v 37 656 1941 v 38 151 1945 v 42, 3). The effect of this drug on the microfilariae and adult forms of *Dirofilaria immitis* in naturally infected dog was therefore investigated. After microfilariae counts had been performed in 6 dogs for some days to note the variations in number present the animals were treated with 0.8 mgm. Sb per kilo intravenously till the parasites disappeared from the blood, which occurred in 10 to 22 days. The dose of Sb required to cause disappearance appeared to be unrelated to the numbers of microfilariae originally present. Two further courses of the drug were then administered and over a subsequent period of 1 week no parasites were found in blood. Changes in their structure or motility had not been observed during treatment. Six other naturally infected dogs served as controls in these experiments. In one treated dog autopsy was performed 1 day after disappearance of microfilariae and fragmented forms of the latter were seen in the tissues of blood vessels in lungs and in kidneys apparently being ingested by phagocytes. The drug which was non-toxic in the above doses therefore appeared to be rapidly effective against these young forms. The chief pathological lesions found in the remaining 5 dogs were in lungs and kidneys. Of 26 adult worms found however only 10 were dead and in them few pathological lesions were present. Developing forms however were generally absent from the uterus and, in the male, spermatozoa appeared to be affected. The author doubts the value of anthiomaline against the adult worms.

Neostibosan a pentavalent Sb compound has also been stated to be active against various microfilariae (this Bulletin 1940 v 37 836 1945 v 42 196 1948 v 43 54). Its effect was therefore studied above in the same infection in 6 dogs. In a first course of therapy 10 mgm. Sb per kilo were given 5 times weekly for 14 doses. At the end of 11½ weeks microfilariae were still present but in greatly reduced numbers. Re-treatment was begun 1 week later as symptoms became apparent and were followed by the death of some dogs. At the end of a further period of 1 week microfilariae were absent from the blood. Results showed however that neostibosan was not effective against the adult worms since 63 of 71 worms found at autopsy were male and ovaries and testes were normal. J. D. Hall

DUBOIS A. Notes sur la partion de *D. streptocera* à l'ouest de l'Algérie (Distribution of *Diptera* species etc. extra in Pawa. An. n. 1) J. d. Zool. 1914 June 30 28 v 1 151-3

As a result of skin examination on a limited number of individuals from various localities in Pawa, the author concluded that infection with *D. streptocera* has a wide distribution in that region and that it occurs in parts of different kinds of country including forest woodlands and in arid and semi-arid as well as in marshy country. The most widely distributed biting insect is *Culex* which is common in some places and less common in others while *mosquito* was absent or rare in the latter part of the region. Dissection of small numbers of *Culex* and *Aedes* mosquitoes proved negative but *Culex* is suspected to be the transmitter. J. J. C. Butler

PERRY, W L M A Case of Dracontiasis [Memoranda] *Brit Med J* 1948, Dec 25, 1107

An African male of 26 presented with a painless lump in the left groin, of 4 years' duration. Examination revealed a small easily reducible indirect inguinal hernia, not extending into the scrotum. No parasites were found in blood films, but there was an eosinophilia of 8 per cent.

At operation, the grossly thickened and fibrosed hernial sac was found to contain part of a female guinea-worm, the head and some 5 cm of its body were free in the lumen of the sac, the remainder being embedded in the wall. The worm was drawn out intact by steady traction. Convalescence was uneventful.

The unusual site of infestation caused a careful identification of the worm to be made. It was 23.7 cm in overall length, with a mean diameter of 1.4 mm. The body was an elongated cylindrical cord with a rounder anterior end and a hooked posterior end. The mouth parts and genitalia were typical of *Dracunculus medinensis*. The worm did not appear to be gravid and no male was found.

Despite its smaller size, the worm was otherwise characteristic of *D. medinensis*. There seems to be no previous record of this worm occurring solely in a hernial sac.

H J O'D Burke-Gaffney

DEFICIENCY DISEASES

NICHOLLS, L The Signs of Malnutrition and the Significance of them in Public Health Practice *Med J Malaya* 1948, June, v 2, No 4, 247-50

Extreme and florid forms of malnutrition such as beriberi and pellagra have recently received much attention from clinicians and research workers, as have such subjective manifestations as 'burning feet' and night-blindness. There are a number of relatively minor blemishes, found in high incidence among the malnourished, which may readily be detected in rapid examinations and which can provide valuable information in clinical survey work.

The aetiology of these minor signs, affecting mainly the skin, eyes and mouth, is as yet by no means certain, as multiple deficiencies and even non-nutritional causes may contribute to their production.

Among the signs most frequently attributed to vitamin A deficiency are thickening of the bulbar conjunctiva with or without Bitôt's spots, keratomalacia and follicular keratosis. Among the manifestations believed to be due to deficiency of riboflavin and allied factors are hyperaemia with vascularization of the cornea, cheilosis, angular stomatitis and a variety of tongue changes.

Hypochromotrichia, dry staring hair, seborrhoeic and mosaic skin and folliculosis are signs almost invariably associated with malnutrition, but of which the exact interpretation is still obscure.

The author emphasizes that, even in the case of a sign known to be usually associated with a specific deficiency, there may be other contributory causes which may alter the clinical picture.

[There is one point in this valuable paper with which some clinical nutritionists will disagree: the term 'permanent goose flesh' is suggested as synonymous with 'phrynoderma'. This was clearly not the intention of the original proposer of the term (PLATT, *Brit Med Bull*, 1945, v 3, 179) and the two conditions are certainly clinically, and probably aetiological, distinct.]

Dean A Smith

DARTON J. FIDDLAY C. M. & WARD R. D. A Note on Vitamin B Complex Deficiency States among Africans in the Gold Coast. *Trop. Med. & Hyg.* 1949 Nov. v. 4, No. 3 277-82, 1 graph

Five cases of optic atrophy apparently of nutritional origin occurred in African soldiers who for prolonged periods had lived predominantly on white rice instead of on their usual diet of cassava, yams or millet. All had impaired visual acuity, changes in appearance of the fundus and grossly contracted peripheral fields; one had generalized polyneuritis. Biochemical investigations revealed increased level of bi-sulphite-binding substance (BBS) in the urine and a low vitamin B₁ excretion.

These findings stimulated investigation into nutritional status of other Gold Coast soldiers and groups of the civil population. Slight evidence of optic atrophy was found in two other soldiers who had also been living on a rice diet, with associated biochemical evidence of a vitamin B₁ deficiency. There was a satisfactory response to high dosage of vitamin B₁.

Although numerous stigmata of B complex deficiency were found in African civilians, no cases of optic atrophy were discovered.

The soldiers living on a diet of the pattern normally consumed in the Gold Coast were free of deficiency signs which suggests that it is possible to obtain a satisfactory diet from locally available foodstuffs.

[There seem to be important differences between the syndrome here described and that which occurred commonly in the Far East, particularly among prisoners of war. In the latter cases contraction of the peripheral field was absent and the characteristic field defect was a central or paracentral scotoma. Vitamin B₁ was found to be ineffective in treatment even in early cases. SUTHER (this Bulletin 1947 v. 44 674) described the occurrence of amblyopia in over 30 patients who were under treatment with vitamin B₁ for beriberi at the time of onset. Moreover in most of the groups studied, there was a far closer relationship between amblyopia and such deficiency manifestations as oro-genital syndrome and burning feet than between amblyopia and beriberi.]

Des. I. Smith

BURGESS, R. C. Some Aspects of Malnutrition in Malaya. *M. J. J. Malaya* 1948 June v. 2, No. 4 239-46, 5 figs.

Malnutrition is one of the most important causes of ill health in Malaya. The incidence of deficiency diseases was extremely high during the Japanese occupation but there has been no satisfactory improvement since 1945 in such respects, particularly in the case of beriberi. The improvement so far has been due to artificial and transient circumstances mainly the importation of Australian wheat.

Surveys have recently been undertaken of nutritional status in rural areas in Malaya embracing clinical, dietary, sociological and economic aspects of the problem. Data derived from clinical examination, height, weight, blood data and talc saturation indicate deficiency in almost all of the subjects and these are confirmed by dietary survey.

Poverty is the main cause of the poor dietary intake. It can be shown that protein and calorie intakes are directly related to the money available to the family for expenditure on food. Vitamin A and riboflavin intakes, on the other hand, largely uninfluenced by economic factors, and their deficiency in the diet is mainly a matter of ignorance, prejudice and the unavailability of foodstuffs rich in these nutrients.

As the economic side of the survey showed that the money spent on food in most families is over 80 per cent of the total expenditure, the problem is

clearly an economic one, and can only be solved by country-wide measures of increased and better food production, education and economic betterment
Dean A Smith

SPRUE

PRUSS J Sprue Diagnosis and Differential Diagnosis *Indian Physician*
1948 Oct \ 7, No 10 265-72

BENAIM PINTO, H & ARENAS, J V Investigaciones sobre el sprue en Venezuela. Nota preliminar [Preliminary Study of Sprue in Venezuela] *Archivos Venezolanos de Patol Trop y Parasit Méd* 1948, Jan, v 1, No 1, 144-80, 13 figs [22 refs] English summary

A survey was made in Venezuela for possible cases of sprue and it was found to be present where it was thought not to exist

In one case especially, which was studied in detail, the authors found macrocytic anaemia, with megaloblastic marrow, steatorrhoea, cachexia, glossitis, asthenia, and oedema, flat glucose tolerance curve, normal bilirubinaemia and normal gastric acidity. The jejuno-ileum was filled with gas and skiagraphy presented the picture of marked dilatation with abnormalities of the mucous folds. These symptoms appeared in a hitherto apparently healthy young woman after delivery. In association with sprue, the authors found two other syndromes: one a mild chronic nephritis, the other an enlargement of the liver probably due to previous amoebiasis or schistosomiasis mansonii

P Manson-Bahr

GARCIA LOPEZ, G, MILANES, F, LOPEZ TOCA, R, ARAMBURU, T & SPIES, T D The Maintenance of Patients with Tropical Sprue by means of Massive Doses of Synthetic 5-Methyl Uracil (Thymine) *Amer J Med Sci* 1948, Sept, v 216, No 3, 270-74, 4 figs

It has now been amply demonstrated that synthetic 5-methyl uracil (thymine) is capable of producing clinical and haematological response in patients with pernicious anaemia, nutritional anaemia and tropical sprue. It appears to have no special advantage over folic acid, and is effective only in several thousand times the dosage. Neither is it effective in preventing the onset of subacute combined degeneration of the cord in Addisonian pernicious anaemia, nor is it effective in retarding this process when once it has been initiated. The present study concerns itself with the maintenance of three selected patients, suffering from tropical sprue in relapse, for at least one year after the administration of large doses of thymine.

Three white Cubans (2 males and 1 female) were selected whose illness was characterized by the standard criteria already adopted in the previous studies by these workers.

After preliminary and thorough investigations each received 15 gm of thymine daily in two doses of 7.5 gm each. They were detained in hospital until they had recovered and their blood values had approached normal.

A definite haematological response ensued. Reticulocytosis commenced on the 4th or 5th day of therapy, reached its peak on the 8th or 9th, and was followed by a rise in the erythrocytes and haemoglobin. This was confirmed by sternal puncture, which showed almost complete obliteration of the megaloblastic arrest.

Clinical improvement coincided with the advent of reticulocytosis.

DAWSON J. FINDLAY G. M. & WARD R. D. A Note on Vitamin B Complex Deficiency States among Africans in the Gold Coast. *Trans. R. Soc. Trop. Med. & Hyg.* 1948, Vol. 42, No. 3 277-82, 1 graph.

Five cases of optic atrophy, apparently of nutritional origin, occurred among African soldiers who for prolonged periods, had lived predominantly on white rice in stead of on their usual diet of cassava, yams or millet. Others had impaired visual acuity, changes in appearance of the fundus and grossly contracted peripheral field. One had generalized polymyositis. Biochemical investigations revealed increased level of bisulphite-binding substances (HBC) in the urine and a low vitamin B₁₂ excretion.

These findings stimulated investigation into nutritional state of other Gold Coast soldiers and groups of the civil population. Slight evidence of optic atrophy was found in two other soldiers who had also been living on a rice diet with associated biochemical evidence of vitamin B₁₂ deficiency. There was a satisfactory response to high dosage of vitamin B₁₂.

Although numerous stigmata of B complex deficiency were found in African civilians, no cases of optic atrophy were discovered.

The soldiers living on a diet of the pattern normally consumed in the Gold Coast were free of deficiency signs, which suggest that it is possible to obtain a satisfactory diet from locally available foodstuffs.

[There seem to be important differences between the syndrome here described and that which occurred commonly in the Far East particularly among prisoners of war. In the latter case contraction of the peripheral field was absent and the characteristic field defect was a central or paracentral scotoma. Vitamin B₁₂ was found to be ineffective in treatment even of early cases. SUMNER (this Bulletin 1947 44 604) described the occurrence of amblyopia in over 80 patients who were under treatment with vitamin B₁₂ for beriberi at the time of onset. Moreover in most of the group studied there was a closer relationship between amblyopia and such deficiency manifestation as oedema, genital syndrome and burning feet than between amblyopia and beriberi.]

DEAN I. SMITH

BURGESS R. C. Some Aspects of Malnutrition in Malaya. *Med. J. Malaya* 1948 June 5, No. 4 229-38 5 figs.

Malnutrition is one of the most important causes of ill health in Malaya. The incidence of deficiency diseases was extremely high during the Japanese occupation, but there has been satisfactory improvement since 1945 though in some respect, particularly in the case of beriberi, this improvement may well be regarded as due to artificial and transitory circumstances, mainly the importation of Australian wheat.

Surveys have recently been undertaken of nutritional status in rural areas in Malaya embracing local dietary, sociological and economic aspects of the problem. Data derived from clinical examination, height and weight data and vital statistics indicate deficiency in almost all strata of the population as confirmed by dietary surveys.

Poverty is the main cause of the poor dietary intake. It can be shown that protein and calorie intakes are directly related to the money spent in the family for expenditure on food. Vitamin A and riboflavin intakes are on the other hand, largely uninfluenced by economic factors and their deficiency in the diet is mainly a matter of ignorance, prejudice and the unavailability of foodstuffs rich in these nutrients.

As the economic side of the survey showed that the money spent on food in most families is over 80 per cent of the total expenditure, the problem

clearly an economic one, and can only be solved by country-wide measures of increased and better food production, education and economic betterment
Dean A Smith

SPRUE

PREUSS, J Sprue Diagnosis and Differential Diagnosis *Indian Physician*
1948 Oct \ 7 No 10 265-72

BENAIM PINTO, H & ARENAS, J V Investigaciones sobre el sprue en Venezuela. Nota preliminar [Preliminary Study of Sprue in Venezuela] *Archivos Venezolanos de Patol Trop y Parasit Méd* 1948, Jan, v 1, No 1, 144-80, 13 figs [22 refs] English summary

A survey was made in Venezuela for possible cases of sprue and it was found to be present where it was thought not to exist

In one case especially, which was studied in detail, the authors found macrocytic anaemia, with megaloblastic marrow, steatorrhoea, cachexia, glossitis, asthenia, and oedema, flat glucose tolerance curve, normal bilirubinaemia and normal gastric acidity. The jejuno-ileum was filled with gas and skiagraphy presented the picture of marked dilatation with abnormalities of the mucous folds. These symptoms appeared in a hitherto apparently healthy young woman after delivery. In association with sprue, the authors found two other syndromes: one a mild chronic nephritis, the other an enlargement of the liver, probably due to previous amoebiasis or schistosomiasis mansoni

P Manson-Bahr

GARCIA LOPEZ, G, MILANES, F, LOPEZ TOCA, R, ARAMBURU, T & SPIES, T D The Maintenance of Patients with Tropical Sprue by means of Massive Doses of Synthetic 5-Methyl Uracil (Thymine) *Amer J Med Sci* 1948, Sept, v 216, No 3, 270-74, 4 figs

It has now been amply demonstrated that synthetic 5-methyl uracil (thymine) is capable of producing clinical and haematological response in patients with pernicious anaemia, nutritional anaemia and tropical sprue. It appears to have no special advantage over folic acid, and is effective only in several thousand times the dosage. Neither is it effective in preventing the onset of subacute combined degeneration of the cord in Addisonian pernicious anaemia, nor is it effective in retarding this process when once it has been initiated. The present study concerns itself with the maintenance of three selected patients, suffering from tropical sprue in relapse for at least one year after the administration of large doses of thymine.

Three white Cubans (2 males and 1 female) were selected whose illness was characterized by the standard criteria already adopted in the previous studies by these workers.

After preliminary and thorough investigations each received 15 gm of thymine daily in two doses of 7.5 gm each. They were detained in hospital until they had recovered and their blood values had approached normal.

A definite haematological response ensued. Reticulocytosis commenced on the 4th or 5th day of therapy, reached its peak on the 8th or 9th and was followed by a rise in the erythrocytes and haemoglobin. This was confirmed by sternal puncture, which showed almost complete obliteration of the megaloblastic arrest.

Clinical improvement coincided with the advent of reticulocytosis.

Each of the patients gained weight and was free from symptoms at the time of discharge.

During the year which has elapsed, the blood values have been maintained at normal level and the patients have had no recurrence of diarrhoea or of alimentary symptoms.

P. Manson-Bell

HAEMATOLOGY

MCCORD W. M., KELLEY W. H., SWITZER, P. K. & CLIF F. B. Viscosity Studies of Erythrocytes from Persons with Sickle Cell Disease. *Proc. S. Exper. Biol. & Med.* 1948 Oct. v. 69 No. 1 19-22 16.

A viscosimetric method is described for the study of the sickling tendency of red cells from subjects with sickle cell disease. This method does not differentiate between sickle cell anemia and sickle cell trait. Data are compared with observations of other investigators.

THOMPSON R. H., WILSON J. A. & MACLEOD C. M. Sickle Cell Disease. Report of a Case with Cerebral Manifestations in the Absence of Anemia. (*Ann Intern Med.* 1948 Nov. '49 No. 5 921-8 8 pgs. [31 ref.]

JONES H. L., J. WITZEL, F. E. & D. R. D. H. Sickle Cell Anemia with striking Electrocardiographic Abnormalities and other Unusual Features, with Autopsy. (*Ann Intern Med.* 1948 Nov. '49 No. 5 925-35 11 pgs. 17 ref.]

VENOMS AND ANTIVENOMS

SERGEANT Et Sérothérapie anti-scorpionique (Onchisme noir). Oliver atom médicaux reçues pendant l'année 1947. Treatment of Scorpion Sting with Antivenin. Report for 1947. (*Arch. Inst. Pasteur d'Algérie* 1948 Sept. 26 No. 3 253-8

During 1947 the Pasteur Institut, Algeria, has received reports of 98 persons stung by scorpions. In 348 of these the symptoms were said to be alarming and giving cause to expect a fatal issue. In 45 others they were serious but not alarming, and in 595 they were mild. In 43 instances only was the scorpion identified. 34 were *Proxenus* and four *Scorpius* was 11 and two *Buthus occiduus*. Special attention is drawn to patients with unusual symptoms or course.

(1) Three (one adult and two infant) already convalescent from scorpion infection of the antivenin. In one case the symptoms subsided in so short a time as half an hour. These three bring the total of such cases in the past 15 years to 151.

(2) One patient gravely ill after a sting on the head. The total of such is now 37 of which 31 were severe.

(3) Sensation of cold, like ice over the whole body in place of the usual sensation of burning at the site of the injury. One patient's temperature was down to 34°C.

(4) Five cases of acute oedema of the limbs, four children on adults. The last disappeared and could not be followed up. One child died and it is noted that the serum was given in too small a dose and not until 3½ hours after the injury was inflicted. The other three recovered.

(5) Two—an adult and a child of 12 years—with multiple stings, three times by the same scorpion. The former was stung three times on the calf and his condition was serious but he recovered. The latter was stung on the back and did not receive treatment until 24 hours later—the child died.

Stings in Northern Africa are commonly by *Prionurus australis*, those by *Buthus occitanus* are rare. Hence, the account of a European, 27 years of age, stung on the right thigh by one of them sent to the Institute is interesting. When seen an hour later, the patient was sweating and complained of sensations of alternating heat and cold, and of sialorrhoea. Ten cc of the antiserum were injected subcutaneously, 30 minutes later the symptoms were worse, with attacks of apnoea but without cyanosis, and a fatal issue was expected. Two hours after the stinging a second injection was given which brought about improvement. An hour later another 10 cc were injected and in 7 hours recovery was complete.

The author states that this is the sixth recorded case of stinging by *Buthus occitanus*, two did not receive the antivenin and died. [The others presumably recovered, the author remarks that in Europe no fatal case of stinging by this species is recorded.]

He stresses once again the precautions to be observed in the treatment of these accidents. That injection of the antivenin should be given as soon as possible, the first dose of 20 cc (2 ampoules) regardless of the age of the patient. If there is no improvement in an hour this should be repeated and even if recovery seems to be complete the patient should be under careful observation for several hours, as symptoms may return and call for more injections. Even if the interval between the infliction of the injury and obtaining the antiserum is a long one—up to 24 hours—recovery is still possible.

Summing up the results. Of the 348 cases regarded as severe 331 were cured (95.1 per cent) during 1947. Throughout the 12 years during which the serum prepared at the Institute has been used, 4,057 patients have received this treatment, 1,003 were in an "alarming even desperate" condition, and of these 923 (92 per cent) were cured. [For references to previous papers in this series, see this *Bulletin*, 1948, v 45, 463.] H Harold Scott

DERMATOLOGY AND FUNGUS DISEASES

REDAELLI, Piero & CIFERRI, Raffaele. *Le granulomatosi fungine dell'uomo nelle regioni tropicali e subtropicali*. [Fungal Granulomata of Man in the Tropics and Subtropics.] *Trattato di Micopatologia Umana*. Florence 1942. Vol 5, pp vii + 698, 2 maps & 195 figs (5 coloured) [50s.]

Although this book was published seven years ago, it contains an immense amount of factual information regarding medical mycology. It is inevitable that the rapid advance made during the war years should not be included, but the work covers a great deal of ground in respect of the material available at the time. In the General Section of the book, the first chapter deals at some length with climatic considerations, with special reference to equatorial zones and the former Italian East Africa. It also discusses relative incidence of fungal granulomata.

The second chapter discusses the pathology and morbid anatomy of human mycoses in the tropics and sub-tropics. The third chapter deals with the systematic classification.

The Special Section contains 12 chapters dealing specifically with the individual conditions, e.g. actinomycosis, rhinosporidiosis, coccidioidosis, various

blastomycosis, histoplasmosis, sporotrichosis, maduroomycosis, verrucous mycosis of the skin, and various miscellaneous mycoses.

Each condition is dealt with systematically and at length with descriptions of geographical distribution, aetiology, pathology, clinical features, diagnosis and treatment. Morphology and cultural methods are discussed and there are good and liberal illustrations of the fungi and the pathological and clinical lesions produced by them.

Each section contains an adequate and often very lengthy bibliography covering a wide range of the literature from many countries.

There is a subject index of more than 700 pages and an authors' index of 14 pages in which the widely international sources of the references are apparent.

This work should provide a great deal of information for medical mycologists, even without familiarity with the Italian language.

H. J. O. D. Burke-Gaffney

HOPKINS, J. C., HILLEGAS, A. B., LEDDY, R. B., REBELL, G. C. & CAMP, F.
Treatment of Hyperhidrosis and Symmetrical Lividities of the Feet. *Arch. Derm. & Syph.* 1945 May 1, 57, N. 3, 650-54, 4 figs.

In the course of a study of dermatophytosis among infantry troops at Ft. Benning, Georgia, the authors encountered numerous cases of severe inflammation of the feet which they attributed to hyperhidrosis. These cases were of two types—(1) diffuse hyperhidrosis in which cases in 3 cases of the whole foot occurred. In this condition the skin was often macerated and there was frequently erythema and oedema of the toes with fissuring of the interdigital webs and sometimes non-suppurative cellulitis of the toes. (2) Symmetrical lividities. These occurred in many men with and a few without general hyperhidrosis. The lesions consisted of sharply bordered plaques of white soggy skin surrounded by narrow violet-red borders. The plaques often appeared slightly raised, and were sometimes extremely sensitive to touch. They occurred most frequently on the sole of the heel and the head of the metatarsals but also on the plantar and lateral surfaces of terminal phalanges and anywhere where the shoe or a neighbouring toe exerted pressure.

In treatment the following preparations were found useful—

(1) Foot baths containing 4 per cent potassium alum seemed the most useful treatment for cases of diffuse hyperhidrosis with inflammation.

(2) A 4 per cent solution of formaldehyde painted on the affected areas gave the most prompt relief in cases of symmetrical lividity.

(3) For dressing denuded areas resulting from hyperhidrosis, tannic acid ointment seemed useful, especially 10 to 20 per cent tannic acid in a carbowax base.

(4) Where prolonged treatment was required, powders were more practical and probably of greater benefit. A powder containing 2.5 per cent exsiccated potassium alum and 5 per cent talc appeared satisfactory but the most permanent and decisive result was given by powders containing 5 per cent paraformaldehyde in talc or bentonite.

H. T. H. Hill

HILL, W. R., RUBENSTEIN, A. D. & HODGES, J. Jr. Dermatitis resulting from Contact with Moths (*Gn. & Hyalus*). Report of Cases. *J. Amer. Med. Ass.* 1945 Nov 6, 138, N. 10, 737-40, 1 fig.

Moths of the genus *Hyalosia* inhabit the tropical regions of America. During the daytime they are found on tree trunk, walls or fences while at night the females appear in large numbers at certain seasons and then mate in swarms. The authors describe how the crew of an oil tanker were exposed to moth which

swarmed on to their ship while it lay off the coast of Venezuela. Of 45 men exposed to the moths, 31 developed dermatitis of a papulo-vesicular or urticarial type. The eruption occurred not only as a result of exposure to moths but also after contact with moth-stained bed sheets. The diagnosis was confirmed by positive reactions to patch tests with moth hairs. *H T H Wilson*

CLARK, M. **Lymphostatic Verrucosis in the Fort Hall District of Kenya** *Trans Roy Soc Trop Med & Hyg* 1948, Nov, v 42, No 3, 287-90, 4 figs on 2 pls

In the last 3 years the author of this article has seen 200 cases of the condition described in Uganda by LOWENTHAL [this *Bulletin*, 1935, v 32, 182] as lymphostatic verrucosis. The patients were Africans who lived round the foot of Mount Kenya and Aberdare Mountain Range. The condition was recognized clinically by the following features: (1) oedema of the leg extending up to, but never above the knee, (2) a barnacle-like growth of the foot, (3) ulceration, usually starting at the toes, and sometimes becoming severe enough to necessitate amputation.

Although generally bilateral, the condition, even when far advanced, was not infrequently limited to one leg. The hands and other parts of the body were never involved.

Attempts to isolate a causal organism by inoculation to media and inoculation into rabbits were unsuccessful.

Although lymphostatic verrucosis is frequently confused with mossy foot, there are several fundamental differences between the two conditions. Mossy foot starts with a vesicular stage, is painful, and bleeds easily on slight injury, it attacks parts of the body other than the leg, and can be transmitted to rabbits.

The author was unable to find any evidence of filarial elephantiasis, which is an unknown disease in the Fort Hall district, or of yaws in any patient suffering from lymphostatic verrucosis.

Routine treatment consisted of scraping away the growth with a short amputation knife. Bleeding was slight after this procedure, the growth did not tend to recur, and permanent benefit resulted. *H T H Wilson*

ALEIXO, J & FURTADO T A. **Micose de Lutz de início possivelmente dentário (Relato de cinco casos)** [Mycosis of Lutz possibly of Dental Origin. Report of Five Cases] *Brasil-Médico* 1948, July, 17, 24 & 31, v 62, Nos 29, 30 & 31, 265-8, 6 figs. English summary (9 lines)

The epidemiology of South American Blastomycosis (Lutz's disease) is rather obscure. Lacaz cultivated the causative fungus, *Paracoccidioides brasiliensis*, on various vegetable materials including mushrooms, and the almost constant occurrence of early lesions of the disease about the buccal, lingual and pharyngeal mucosae and the tonsils lends credence to the view that infection is caused by chewing vegetable matter on which the fungus has been growing saprophytically. LACAZ and DE OLIVEIRA [this *Bulletin*, 1949, v 46, 84] have recently described a few cases in which the initial lesions occurred in the anal region and were attributed to the use of raw vegetable matter in attending to the toilet of the anus.

BOGLIOLO [this *Bulletin*, 1947, v 44, 349] described a granuloma of a tooth socket which was caused by *P. brasiliensis*, and the present authors have added five new observations suggesting infection in connexion with the teeth. In all five cases there was a history of severe dental disease, usually associated with pain, inflammatory swelling and ulceration, and all were treated by extensive extractions of the affected teeth, which were followed within a few months by active granulomatous ulceration which spread to the lips and neighbouring

extradural block. Healing within 7 days was nearly complete and the patient was discharged 11 days after block. [No mention is made of local treatment.]

Where skin anoxia is due to structural disease of the arteries sympathetic block cannot be regarded as being specific as the lumen of the affected arteries is probably incapable of much increase. The sharp rise in skin temperature following sympathetic block suggests that the released vessels are in a state of vasospasm.

The aetiology of tropical ulcer is summarized as Skin anoxia and infection. In difficult cases treatment should be given for both factors. C. F. Shelton

MISCELLANEOUS DISEASES

GALLIARD H. Myiasis humaine en Tonkin. (Human Myiasis in Tonkin)
Bull. Soc. Path. Exot. 1948, 41, No. 3, 423-33.

Fifteen cases of myiasis have been observed in the clinics of the Faculty of Medicine at Hanoi. Of these larvae were found in the external auditory meatus on five occasions, once in a case of otitis of the left ear, seven times in wound or ulcers of the legs or feet, once in an abscess of the hand, and once in an ulcer of the scalp. In the last case the larvae were those of *Wormphora* *f. senilis* and in all the rest *Chrysomya* *bezzii*.

The case of *S. fascicularis* infestation was that of a child of 1 month whose mother gave a history of furuncles of his scalp that opened spontaneously. Maggot were observed in the ulcers, these persisted despite treatment with 'home remedy'. When seen the child had two large oval ulcers (4 to 5 cm. with jagged edges) in the parietal region and several smaller ulcers on the occiput. There was a foetid purulent discharge, later the ulcers joined and a large area of bone was laid bare. The child's temperature rose to 39.6°C (103.5°F) and remained in the region of 38.0°C (100.4°F) for nine days. The ulcers were filled with larvae of *S. fascicularis* which were removed by means of forceps and an antiseptic lauge. At the time of discharge a week later the temperature was normal and the ulcers improved but not completely healed.

The second case described was that of an Annamite infant who was admitted to hospital with necrosis of the angle of the jaw. The wound was gangrenous and full of larvae. This condition was effectively treated but the child was brought back forty days after discharge from hospital with supra-clavicular adenitis. This improved on local treatment but the child returned a third time with a fluctuating and painful swelling of the gland which was finally opened four months and seven days after the child first came in and a dead but well-preserved third-stage larva of *C. bezzii* was recovered from the abscess.

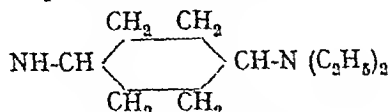
The larvae of *C. bezzii* are not recognized in Africa or in the Philippines as infecting man but are only parasites of animals. L. E. Napier

PROTOZOOLOGY CENTRAL

ISHII N. Researches on the Chemotherapy of Protozoal Infections. J. *was*
Med. J. 1948 Feb 1, 1, No. 1, 30-51.

This paper describes the results of tests carried out with various compounds on various protozoal infections including human and bird malaria.

Trep duttoni and *Trypanosoma gambiense* infections of mice, kala azar of man and the striped squirrel and *in vitro* tests on *E histolytica* and *Trichomonas hominis*. The English is quaint and there are a number of errors in names and dates. No details are given of the tests, which appear to have been carried out on a very limited scale in man. Two substances, 1-sulphanilamido-3,5-dibromobenzene and its chloro analogue, not antagonized by *p*-aminobenzoic acid, "were applied for three tertian cases with desirable results." These substances, SN 187 and SN 2500 respectively, are described in the Survey of Antimalarial Drugs by WISELOGLE [this *Bulletin*, 1947, v 44, 1106]. Some substituted dihydro-cinchonidines (or cinchonines) showed promise in human malaria and also "modified atabrin" [mepacrine] in which the original side chain of the German product was replaced by



The latter was easier to make than atabrin and proved equally active in canary malaria. "The malaricidal action in five tertian cases was demonstrated with satisfactory results." A natural product from an Asiatic plant—cepharanthin—a benzyltetrahydroisoquinoline described by KONDO & TOMITA (*Arch Pharm* 1936, v 274, 65), was first used in the treatment of tuberculosis and is here described as a provocative for exoerythrocytic forms of plasmodia, through stimulation of endothelial cells whereby the exo-forms appear in the blood stream. In conjunction with standard antimalarial drugs it was reported to eradicate tertian [benign or malignant?] malaria infections. Two other related substances are stated to possess similar properties. A number of sulphonamides were found to be active against *Trep duttoni* infections of mice. Several oxyquinoline sodium antimony compounds (constitution not stated) showed activity against *T gambiense* in mice and *in vitro* against *E histolytica* and *Trichomonas hominis*. Activity is claimed for 4,4'-diguandinodiphenylsulphoxide in the trypanosome infection and in human kala azar. Other compounds found to be active against *E histolytica* were SN 187 mentioned above and also 3-carboxy-4-aminoazobenzene-4'-sulphonamide.

J D Fulton

ENTOMOLOGY AND INSECTICIDES GENERAL

NATVIG, L R. Contributions to the Knowledge of the Danish and Fennoscandian Mosquitoes. *Culleini Norsk Entomologisk Tidsskrift* Oslo 1948, Suppl I pp vii+567, 148 text figs 12 pls & 1 folding map

The present book is a full-length monograph by a man who has evidently worked on the subject for a number of years and has given careful attention to all available sources of information. He is interested primarily in the thirty-five species of Culicine mosquitoes which occur in Denmark, Norway, Sweden and Finland. For these countries he gives detailed local records, outside that area he provides information of a more general sort relating to the same species. A considerable proportion of the mosquitoes of these northern countries have a very wide Arctic distribution in the Old World, several of them occur also in Northern America.

Fifty-five pages are given to an account of the external anatomy of Culicine mosquitoes. The treatment is full with a number of figures, a list of technical

terms and alternative terms used by other authors. Though the section is a valuable one may perhaps ask whether a general account of this nature could not be produced once and for all. It seems hardly necessary that all this information should be repeated as it tends to be in monographs dealing with monogonies of different parts of the world.

After giving a brief account of internal anatomy the author passes to general notes on the biology of northern Culicines. He deals with the type of water in which the different species breed and the association of one species with another. In discussing the feeding habit of adults he quotes the work of others who have shown that not only the males but the females of some Culicines may feed upon nectar in nature. He reaches the conclusion that females of all or nearly all these northern Culicines are bloodsuckers but does not go into the question whether the individual female can lay a small number of eggs if she is unable to obtain a meal of blood.

The transmission of disease by mosquitoes in Northern Europe is relatively unimportant. One should, however, remember that tularaemia is widespread and it appears from the work of Olin that without doubt the infection is occasionally transmitted by mosquito bites. Eosinophilic infection (the St Louis type and the equine) are not known from this area. Fowl pox occurs in Denmark and parasites of several "bird malaria" have been recorded from a number of species of birds in Sweden.

Much more important than the diseases is the mosquito plague, a general and very serious Arctic problem. The author has gathered together extracts from the works of many travellers and recounts his own experience. It is part of the work is most useful for it calls attention to a matter of considerable importance, the number of blood-sucking mosquitoes (hardly to be feared, they cause extreme discomfort by day and by night and may drive man or animals to frenzy, casualties occur owing to swollen hand and faces, fever and lack of sleep. The biological explanation of the immense numbers of mosquitoes is due to the work of the freshwater biologist Thienemann who pointed out that when the ground is frozen it is impossible for water to percolate downwards. When the surface of the ground thaws in the spring and in the summer the water must lie on the top or run over the top, and it may become very warm during the long days of the Arctic summer. For a brief account it gives rise to enormous numbers of adult Culicines, mainly species of *Aedes*. As to the source from which all these mosquitoes would normally obtain blood we are insufficiently informed. The present author does not accept the view of Thienemann that the insect feeds mainly on small rodents (voles and lemmings). He regards reindeer both wild and domestic as a most important source of blood for the mosquitoes but we feel that he hardly gives sufficient attention to the fact that there are many areas in the Arctic with abundant mosquitoes but no reindeer. As it stands he can only give a scanty record of record of mosquitoes feeding upon nestlings. The whole question appears to be one urgently requiring study. It is at least possible that in some of these species the female though willing enough to take blood, can lay a small number of eggs without having fed on blood.

The greater part of the book deals with taxonomy, including taxonomy and nomenclature and the literature of Scandinavian mosquitoes. The author gives some interesting notes on variability and on the seasonal abundance of mosquitoes, calls attention to the fact that in the mosquitoes there are a number of groups of very similar so-called "sibling" species. The systematic section covers thirty-five species of Culicines known to occur in this area. The few Anopheles mosquitoes are not dealt with, one may hope that these will be dealt with in a similar monograph in a similar manner. After reviewing the problem in a thorough manner the author discusses the complex question of the control of mosquitoes.

to geography and so forth. Here we find lists of the mosquito species which are known to occur in each of the countries under discussion together with their distribution outside Scandinavia. One list shows the species of this area and indicates which of them occur also in Siberia or in North America.

The monograph contains 148 figures, many of them dealing with points in the anatomy of larvae and adults. Some deal with breeding places and other biological matters and there are maps of the distribution of many of the species, and on matters of general zoogeographical interest. The paper contains a number of taxonomic keys. The general presentation is excellent. The English is always clear. There is an unusually full list of references and an index.

P. A. Buxton

SÉNÉVET, G. A propos de *Anopheles (Nyssorhynchus) minimus* Senevet et Abonnenc 1938. [*Anopheles (Nyssorhynchus) minimus* Senevet and Abonnenc, 1938.] *Arch Inst Pasteur d'Algérie* 1948 Sept., v. 26, No. 3, 277-9, 1 fig.

SÉNÉVET, G. *Anopheles pessonii* en Guyane française. Description de la nymphe [*Anopheles pessonii* in French Guiana. Description of the Nymph.] *Arch Inst Pasteur d'Algérie* 1948 Sept., v. 26, No. 3, 280-87, 2 figs.

RICHTER, R. G. Encontro da *Chagasia rozeboomii* Causey, Deane e Deane 1944, no estado de São Paulo. [Presence of *Chagasia rozeboomii* in São Paulo.] Reprinted from *Malariaeologia e Doenças Tropicais* Rio de Janeiro 1948, July-Sept., v. 1, No. 1, p. 13.

The English summary appended to the paper is as follows —

In this article the Author refers to a new species, *Chagasia rozeboomii* Causey, Deane & Deane, 1944, found in State of São Paulo, Brazil.

SMITH, C. B. Commonwealth Air-Route Sanitation — a Suggestion. *J. Roy San Inst* 1948 Sept., v. 68, No. 5, 539-44. [12 refs.]

It has been established beyond doubt that many insects which are potential carriers of disease can be transported by aircraft without detriment to themselves to places where they could do great damage as for instance by the dissemination of yellow fever. The organizations concerned in the reduction of this risk are badly co-ordinated, too numerous and often have too parochial an outlook. The author recommends the creation of a high level authority of air sanitation consisting of a committee and a powerful executive staff with powers wide enough to ensure that disease vectors would not be carried on to aircraft rather than as at present to prevent them being brought off them. This would involve supervision of the sanitation of airfields in endemic zones and of the urban areas from which passengers come. In addition sanitary zones should be created co-terminous with the endemic areas of important diseases and a complete protective ring of 'sanitized' airports created within the zone and outside it so that the ports of embarkation and potential dissemination of disease vectors are protected not by quarantine but by sanitation. Further work should also be carried out on the disinsection of aircraft by residual insecticides.

G. Macfarland

CALIFORNIA MOSQUITO CONTROL ASSOCIATION. Proceedings and Papers of the Sixteenth Annual Conference of the California Mosquito Control Association held at Agriculture Hall, University of California, Berkeley California, February 12, 13, 14, 1945. [Edited by H. F. GAY & R. F. PETERS.] 89 pp. 4 figs. & 3 charts. 1945. Berkeley 1 California Post Office Box 649.

In California there are forty-one mosquito abatement districts covering some 16 000 square miles and others are in process of organization. On this work the above Association spends about \$7 000 000 annually and it is likely that this sum will be exceeded in the coming year. At this three-day meeting of the Association, papers were read by many authors and they are reported *verbatim* in this volume which also includes reports on the progress of mosquito control work in other parts of the U.S.A. A wide range of subjects is covered including some of local interest only and dealing with such matters as organization, administration, finance, legal matter and some of a technical nature. A short account is given of the inauguration in 1917 of a State Bureau of Vector Control which comes under the Department of Public Health. In this the author describes the scope and proposed activities of this Bureau and its relationship to local mosquito abatement organizations. A first list of vector-borne diseases to receive immediate attention by the Bureau includes encephalitis, fly-borne diseases, malaria, plague, "Q" fever, relapsing fever, Rocky Mountain spotted fever, tularemia and typhus fever.

Other papers are of more general interest and the fact that most of them are the results of practical experience in the control of mosquitoes and other arthropods adds to their value. Members plead for better diagnosis of malaria and improved methods of keeping records. The flight range of *Culex tarsalis* was discussed, method of dealing with noxious arthropods other than mosquitoes were described, and the importance of the selection of insecticides for particular purposes was stressed. The necessity for continuing the search for new insecticides was also emphasized in view of the resistance and tolerance of DDT and other substances indicated by the contamination of water, the effect on agricultural pests, the danger to fish and the DDT tolerance in certain flies. Other papers describe the application of insecticides from a machine mounted on a jeep, an aerosol generator, amphibian, helicopter, aeroplane spraying and the keeping of mosquito cultures in the insectary.

The importance of maintaining good public relations is pointed out even to the extent of doing extra work not strictly coming under the heading of mosquito control and in propaganda in newspaper, film and radio.

It is inevitable in a report of this kind that there should be some overlapping and repetition, but each author approaches his subject from his own angle and a wide view is thus given of the activities of this association. The conference appears to have been held in an atmosphere of friendly enthusiasm.

H. S. LEE

VANNOTE, R. L. Adult Mosquito Control a Useful Emergency Tool. *Mosquito News*, 1945 Mar., v. 5 No. 1 p. 17-2 figs.

The author is concerned with the protection of large highly-developed residential areas from mosquito nuisance. Circumstances in which the prevention of breeding by permanent means—the most desirable method, other method being brought into use to combat breakdown in the normal programme. The best auxiliary method are then those that produce immediate results.

Pyrethrum sprays applied to ground areas were a great advance. With the arrival of DDT the policy has been to treat the country across which mosquitoes

fly in large numbers by the application of DDT solution from aircraft, and to exterminate those that have reached residential areas by means of smoke from machines such as the Todd Insecticidal Fog Applicator *G Macdonald*

DICKINSON, W H, MERRITT, D & HOUGH, J Observations on a Tifa used by the Consolidated Mosquito Abatement District *Mosquito News* 1948, Mar, 18, No 1, 14-16

The authors' interest is to destroy nuisance mosquitoes, such as *Aedes* species, the breeding of which cannot be controlled, though it may be very extensive as on irrigated land. The Todd Insecticidal Fog Applicator was found to give very satisfactory results. The fog, allowed to drift over agricultural land where such breeding occurred, killed all adult mosquitoes through a strip a mile long, as laid by the machine on a truck, to a depth of one and a quarter miles. The average amount of DDT used was 0.04807 lb per acre thus treated, and the average cost for labour and material 11.5 cents per acre *G Macdonald*

MACCHIARLLO, A Siphonaptera de la costa sur-occidental de América. (Primera lista y distribución zoológica y geográfica) [Siphonaptera of the South-West Coast of America (First List and Geographical Distribution)] *Boletín Oficina Sanitaria Panamericana* 1948, May, 27, No 5, 412-60 [21 refs.]

Over the past fifteen years the author and his colleagues have examined 500,000 fleas during their work in Chile, Peru and Ecuador. From this work and from the literature, the author has been able to compile lists, which are given in full, of seventy-six species of fleas belonging to thirty-seven genera, and of ninety-six hosts, together with locality records which give their distribution in this part of South America *H S Leeson*

LORD, K A The Sorption of DDT and its Analogues by Chitin *Biochem J* 1948, 43, No 1, 72-8

RICHARDS and CUTKOMP (*Biol Bull Woods Hole*, 1946, 90, 97), have pointed out that there is a general correlation between the possession of a chitinous cuticle and sensitivity to DDT poisoning and also that chitin will sorb DDT out of a colloidal suspension. The author has made quantitative experiments which confirm this. Neither sand cellulose nor asbestos appreciably sorbs DDT and though there is some indication of sorption with sheep's wool it is very slight compared with chitin. These facts show that the sorption is not due to mechanical retention of DDT and also, since the cellulose molecule is very similar to that of chitin, that the action is physico-chemical or chemical and rather specific. Grinding of the chitin, which increased its surface area, also increased the amount of sorption, which is therefore a surface phenomenon. It was noted that sorption occurred rapidly at first and then apparently approached saturation. Tests with five DDT analogues (mainly corresponding to the compounds) showed no significant evidence of correlation between toxicity and degree of sorption *J R Bustine*

DE OLIVEIRA, S J & MOISSAHEM, I Ação do DDT (Diclorodifenil-tricloro-etano) sobre larvas e pupas de *Musca domestica* Linneus [The Action of DDT on Larvae and Pupae of *M domestica*] *Rev Bras Lepra Biol* Rio de Janeiro 1947 Mar, 7, No 1, 67-72, 4 figs. [Summary taken from *Rev Inst Med Biol São Carlos* 1948 Oct, 36 Pt 10, 157-8.]

In each of the tests described which were carried out in Rio de Janeiro in 1946, a jar or box was filled with fresh horse manure and left for four days, after

which these larvae of *M. sca domestica* L. in all instars were present. The manure which was about 18 in. deep was then sprayed with suspensions of a preparation containing 10 per cent. DDT (Neocid M) diluted to give 1:2,000, 1:1,000 or 1:500 parts DDT in water at a rate of about 13 pints per 1 yard. The manure was left uncovered after treatment except on one occasion when rain threatened and 3-6 days later 600-1,200 puparia collected from it were placed in groups of 100 in tubes containing a little damp earth and the flies that emerged were counted. The results showed that the percentages of normal, semi-normal and abnormal adults and of puparia from which no emergence occurred were 25.46, 7.23, 1.23 and 55.07 for DDT at 1:1,000, 1:1,000, 1:500 and 93.7 for DDT at 1:1,000 and 11.16, 0.16, 1.44 and 87 in series and 22.5, 16.8, 15 and 45.7 in another for DDT at 1:500. Many of the pupae from which no emergence occurred were abnormal in appearance and dead larvae in all instars were numerous in the treated manure in the trough.

DE MEILLON B, THORP J M. & HARDY F. An Apparatus for the Rapid Screening of Drugs for possible use in Chemotherapeutic Control of Ectoparasites and some Results obtained with it. *South African J Med Sci* 1943, June v 13 No. 3 115-19 1 fig. [14 refs.]

The apparatus consists of a metal slide with a circular depression (about one inch in diameter) which holds about one ml. of blood. Blood is withdrawn from an animal and defibrinated by stirring, before it is added to the cavity. One advantage of the small quantity of blood is that there is little tendency for cells and serum to separate which is important since either serum or cells alone are toxic for some blood-sucking insects (e.g. bed bugs). The metal slide is kept at blood heat on a warm stage and the feeding tube closed with a membrane is placed on it so that it just fits into the blood filled cavity (and displaces a little blood round the rim, which draws and forms a seal).

The feeding tube and membrane are made as follows. A mouse is killed and the whole body is treated with a depilatory (50 per cent barium sulphide, 50 per cent chalk). After thorough washing, the skin is removed and washed in running water for an hour or so, dried on blotting paper and stretched over the mouth of the tube where it is fixed by a rubber band. After use the skin is washed in water *in situ*, dried and stored in a cupboard. It can be used again up to a week after preparation. The feeding tube should not be more than two inches long.

For testing possible insecticidal compounds the samples are added to the blood and ground with it in an agate mortar. Or they can be added in aqueous solution provided that not more than 10 per cent. water is added to the blood.

The compounds tested by the authors follow the work of H. V. D. (et al) [this Bulletin 1943, v 45 815] who showed that the indandione series were promising as chemotherapeutic agents against blood sucking arthropods. This fact is confirmed. Particularly promising are the substances related to vitamin K, i.e. anti-haemorrhagic agents the calcium and sodium salt of 2-methyl-1,4-naphthahydroquinone diphosphate (Synkafit).

J. R. D. 1944

WILSON S. G. A Method of assessing the Acaricidal Properties of DDT and "Gammaxane" Preparations in Field Trials. *Bull Entom Res* 1943 Aug. v 38 Pt. 2, 239-76 5 figs.

Cattle in the neighbourhood of Entebbe, Uganda are liable to be infested with a variety of tick species which characteristically attach at different parts of the body. Some preliminary indications of the chosen foci of several ticks

are given in a sketch. For the purpose of insecticidal tests, it would be difficult to make complete counts, therefore results were judged on the counts of *Rhipicephalus appendiculatus* attached on the ears and *Amblyomma variegatum* on the udder and flanks of cattle.

For control purposes, DDT and gamma BHC have many advantages over arsenic. Some trials of these preparations were made with a DDT emulsion and a gamma BHC aqueous suspension (prepared from the dispersible powder P530). Preliminary field trials showed that both 2.5 per cent DDT or 0.325 to 0.65 gamma BHC gave a fairly good kill of the ticks, but very little protective action beyond four days. The addition of coumarone resin to the DDT emulsion did not improve its residual action. At the suggested rates, it would be necessary to treat cattle weekly to obtain control.

Treatment was easily achieved by spraying the cattle's ears with a "Kent" type sprayer, while they walked through a bath of insecticide which treated the udder and flanks.

J R Busvine

LAW, S. G. A Biological Test for assessing the Acaricidal Properties of DDT and "Gammexane" Preparations. *Bull. Entom. Res.* 1948, Aug., v 39, Pt 2, 277-9, 1 fig.

For each test an open-ended tube, 10 cm. long by 2 cm. in diameter is used. It is lined with a small roll of filter paper which is moistened with 0.5 ml. of the insecticide liquid under test. The ends of the tube are sealed by caps formed of filter paper moistened with the insecticide in the same way and bound in position with gummed paper while still moist.

The ticks (either laboratory bred or freshly collected) are placed on a square of filter paper and swabbed with the test solution. About 10 are used for each test. They are then placed in the prepared tube by removing and then replacing one of the paper caps. The tube is left horizontal and the filter paper caps, etc., dry in 3-6 hours. Mortalities of ticks are determined after 6, 24, 48 and 72 hours.

It is claimed that the method reproduces the conditions of practical dipping of infested animals, in which the ticks experience initial soaking in insecticide, followed by exposure to a moist surface which gradually dries.

J R Busvine

PLACKETT, R. L. & HEWLETT, P. S. Statistical Aspects of the Independent Joint Action of Poisons, particularly Insecticides. I. The Toxicity of a Mixture of Poisons. *Ann. Applied Biol.* 1948, Sept., v 35, No 3, 347-58, 5 figs. [14 refs.]

RAMALHO, A. C. R. & RABELLO, E. X. Sobre uma nova fórmula de corante para material entomológico. [A New Staining Formula for Entomological Material]. *Gaz. Clínica*, S. Paulo, 1947, Nov.-Dec., v 45, Nos 11/12, 169-70.

The authors give the formula of a stain which they have found to be suitable and constant for small insects or for minute parts of small insects such as genitalia, mouthparts, etc., for microscopical examination. It is made up of one gramme of fuchsin and 1 gramme of eosin dissolved in 100 cc. of 80 per cent alcohol to which is added 100 cc. of 10 per cent acetic acid. The mixture must be filtered before use.

After the insect or part has been softened and cleared in warm 10 per cent caustic potash, it is put straight into the stain and gently warmed for a minute or so. The rest of the procedure is as usual through creosote to Canada balsam for mounting.

H S Lesson

BOOK REVIEWS

GRADWOHL, R. B. II [M.D. D.Sc., F.R.S.T.M. & H. (London) etc., *Clinical Laboratory Methods and Diagnosis. A Textbook on Laboratory Procedures with their Interpretation. Vol. I. 4th Edition. pp. xbi+1294 41 coloured pls. 362 text figs., 4 charts & 5 graphs. 1948. St. Louis: The C. V. Mosby Company. [3 vols. \$40]*

This the fourth edition of a book which has been generally acknowledged as a standard work has proved to be a stupendous undertaking. From comparatively modest beginnings in 1905 it has blossomed out into three bulky volumes of which the first two are devoted to laboratory procedures and the third to parasitology. Of the three before us this first undoubtedly contains the most indispensable information and is also the most bulky. It is almost impossible within the space of a review to give an adequate idea of the mass of detail which this book contains, most of which is essential to the modern laboratory worker. There are nine chapters. The first is devoted to general considerations, such as the microscope, photomicrography, the analytical balance, metric weights and measures, general facts on solutions and an explanation of the hydrogen ion concentrations. Chapter II deals mainly with urine analysis. Among other methods are general directions for collecting specimens, detection of sugar, albumin and proteoses, determination of drugs in urine, microscopic examination, special urine chemistry, cystoscopic urinalysis and estimation of kidney functions.

As the author announces in the preface, one of the fundamental subjects in modern haematology so that the next three chapters, III to V, are occupied with the most complete and up-to-date account of this important specialty grouped under the headings of blood chemistry, haematology, blood grouping and transfusion. This is undoubtedly the high-water mark of the book and the treatment of this huge subject is almost without a rival. Here we find directions for methods of procuring and handling blood for chemical examination, clinical colorimetry, the technique of blood chemistry, blood sugar estimation, glucose tolerance test, total non-protein nitrogen, interpretation of blood changes in nephritis, liver function tests, cholesterol, calcium, inorganic phosphorus, acidosis, blood ketones, sulphonamide drugs and estimation of blood thiocyanates. Haematology proper deals with the origin of blood cells, the physiology of haematopoietic organs, normal composition of the blood, description of stained cells, bone marrow studies, special staining methods, tests for coagulation of blood, relationship of the liver to blood disorder and diseases of the reticulo-endothelial system, blood picture in various infectious diseases and haematology of infants and children.

Blood groups and transfusions demand a knowledge of the technique of blood grouping, agglutininogen Rh in human blood, whole blood transfusion and prevention of haemolytic reaction, blood plasma, bone marrow infusion, protein metabolism and parenteral protein hydrolysate, blood groups and heredity.

Chapter VI deals exhaustively with gastric analysis, test meal examination, microscopic examination and the conclusion to be drawn and similarly the technique of estimation of duodenal contents.

Chapter VII is devoted to the examination of puncture fluid, cellular structure of effusion, aspiration biopsies and cerebrospinal fluid.

In Chapter VIII the faeces are given general consideration and the account follows accepted lines.

In Chapter IX special tests are described, among directions such as determination of cystine in fingernails, laboratory test for pregnancy, arterial

smears, suction curettage, hypersensitiveness, protein sensitization, mycological diagnosis, semen appraisal, deficiency diseases and special tests in connexion with examination of food contamination

The whole book appears to be meticulously compiled and the descriptions are particularly clear and accurate. A feature which will commend itself is the full documentation in the form of footnotes.

The volume is printed on art paper, the type is clear and all the figures, photographic and otherwise, are beautifully reproduced and this especially applies to the coloured plates of blood pictures and bone marrow smears. Laboratory workers the world over will be grateful to Dr Gradwohl in having completed such an outstanding compilation.

P Manson-Bahr

GRADWOHL, R B H [M D, D Sc, F R S T M & H (London), etc.] **Clinical Laboratory Methods and Diagnosis. A Textbook on Laboratory Procedures with their Interpretation. Vol II. 4th Edition.** pp 1297-2284 + 127 pp of Index to Vols I & II, 328 text figs & 10 coloured pls. 1948. St Louis. The C V Mosby Company. [3 vols \$40]

This is the second volume of the fourth edition of what has become a much valued book of reference on a large variety of technical procedures, though throughout it has managed to preserve its human values without degenerating, as it might so easily have done, into a mere encyclopaedia. The main topics are grouped under the headings of Bacteriologic Application to Clinical Diagnoses, Serology, Postmortem Examinations, Tissue Cutting and Staining, Preparation of Museum Specimens, Toxicological Technique, Detection of Crime by Laboratory Methods, Basal Metabolism, Electrocardiography, Museum Supplies, Equipment and Reagents for Pathological Laboratories. This surely constitutes a motley heterogeneous collection, but the reader must not imagine because it is so, that each section does not provide an up-to-date authoritative account of each subject, so that the book has become an indispensable adjunct of every pathological and clinical laboratory.

We can point out, for instance, the value of a list of certified stains prepared by the Biological Stain Commission and this includes the methods of application. A very useful plate (XLII) illustrates the tints produced by adding phenolsulphonaphthalein (phenol red) to a series of phosphate solutions of H ion concentrations indicated in each case by pH.

Some 43 pages are devoted to the preparation of various specialized media and some 20 to culture methods. The classification and identification of pathogenic organisms are gone into at great length and in this respect the *Salmonella* group is given special preference in a manner hardly to be found elsewhere, and a table (XCVI) epitomizes the characteristics of no less than 113 members of this group. It is surprising to find that the dysentery bacilli in contrast receive so little attention. Those spirochaetes which are referred to under the generic title of *Borrelia* are dealt with more extensively in Vol III but the genera *Treponema* and *Leptospira* receive their due.

In the section on tuberculosis, the simplification of fluorescence microscopy as devised by Graham is given in detail. The bacteriology of milk, testing of disinfectants, the vexed question of bacteriophage in diagnosis and therapy are each considered in the light of modern knowledge and the reader will also find a fairly complete account of rickettsias and virus diseases and the classification of the latter is compressed in table form (CXIX). Rabies also receives considerable space and a resume is given of the Pasteur treatment of this fell disease. The section on serology occupies more than 100 pages, the greater part being taken up by various modifications of the Wassermann and Kahn tests.

It is possibly more detailed than in any other publication and also includes the technique for the complement fixation test for amoebiasis.

Chapter XII which describes postmortem examination is well illustrated with elaborate and expensive apparatus such as is seldom available to pathologists in this country.

Chapter XIII on tissue cutting and staining follows on well tried lines and describes the technique of frozen section according to the method of Krause, whilst great importance is paid to the selective cytology of Ayre for obtaining biopsy material from the cervix uteri. T. V. urological methods and the detection of crime occupy a niche of their own and demand such specialized apparatus and technique as to be outside the scope of the ordinary medical reader. They include the sensational polygraph or "lie detector". In basal metabolism we find ourselves in a new world and these investigations embrace many elaborate methods to which perhaps too little attention has been devoted on this side of the Atlantic. It might be thought that electrocardiography was such a wide subject that it should embrace a whole volume to itself but it is here disposed of in 50 pages so that we must agree with the conclusion that this chapter is intended to give the reader only an introduction to the subject even if it unfortunately conveys the impression that a normal electrocardiogram does not always exclude the presence of organic heart disease.

Chapter XIV which consists of a list of the minimum requirement and supplies, equipment and reagents to furnish pathological laboratories should impress the tyro with the truly herculean task which lies before him.

It is hardly necessary to state that this publication is beautifully produced and printed on the best art paper that the illustrations are all that could be desired and that the binding is substantial as well as attractive. Such are the advantages of the absence of austerity in medical books to which the great of the times have accustomed us in Great Britain.

Search for misprints or inaccuracies has been in vain but we would like to draw the attention of the able reader of Chapter V to the Americanization of such a familiar name as that of Sabouraud.

P. V. von Dake

GRADWOLD, R. B. H. (M.D. D.Sc. F.R.S.M. & H. (London) etc. & ROSSI, Pedro (Director, Institute of Tropical Medicine, Havana University etc. Clinical Laboratory Methods and Diagnosis, Vol. III, Parasitology and Tropical Medicine, 4th Edition, pp. viii+864 (201 vi fig. 17 coloured pls. 1918, St. Louis: The C. V. Mosby Company) 3 ls. \$40

This third volume is undoubtedly a book which will arouse considerable interest and no doubt give rise to some measure of comment spreading. It has done like a new constellation in the southern hemisphere among a full account of tropical parasitology. In some respects it has succeeded in doing so in others it has failed. Quite naturally there is laid upon the not inconsiderable achievements of the Cuban and South American schools—and in the book: none the worse for that.

The work is illuminated throughout by essays upon the underlying principles of helminthology and protozoology. Thus we find a history of these respective sciences and an enunciation of the nomenclature of parasitism, reaction of the organism to infection and methods of diagnosis. The subject of medical protozoology is handled on biological lines and the amoebae *E. histolytica* in particular are minutely described and handsomely illustrated but it must be confessed that the clinical section, not so fortunate in treatment in particular, an optimistic attitude is adopted. A large series of drugs is advocated special prominence being given to the product of the Laboratory Kala. The intestinal flagellates which are really of minor importance are given perhaps

undue prominence. In a work on tropical medicine it might have been expected that malaria would occupy a position of prime importance, but in this expectation we are disappointed and find an inadequate and somewhat fallacious account crammed into some 27 pages. A coloured plate (Pl IV) conveys what is now known to be an incorrect idea of the life history of the main species of human *Plasmodium*. No allusion is made to the exoerythrocytic cycle, but Schaudinn's original figure of the penetration of the sporozoite into the erythrocyte is reproduced (Fig 47) as well as a purely imaginary diagram (Fig 55) copied from Brumpt and Neveu-Lemaire showing a hypothetical tissue stage in the capillary endothelium in the case of *P falciparum*. It conveys the impression that a study has not been made of the vast literature of this subject and imparts the idea that *P falciparum* is the longest-living malaria parasite in the human body, through a misprint on p 228 of this species for *P malariae*.

In the same vein it is permissible to annadvert upon the section on human and animal trypanosomes, which enormous subject is dismissed in 13 pages, while the almost equally important subject of the leishmaniases is vouchsafed only two. In contrast to this meagre appropriation, the section on helminthology, which is mainly based upon the observations of the junior author, is a massive affair occupying no less than 523 pages. It is illustrated by magnificent photographs mainly by Kouri, and also by fine line diagrams, so that it is questionable whether anything of its kind exists in any other publication. Some may consider it pretentious, others, rather unbalanced because considerable space is devoted to the rarer or accidental helminthic human infections. It is questionable, too, whether so much importance should be attached to infections such as trichuriasis and to the practice of crediting the whipworm with pathogenic properties on rather slender ground. To the clinician this constitutes rather a dangerous practice. In this connexion there is a remarkable plate (Fig 65) depicting the hatching of the larval trichurids from the egg. No mention is made of the parasitic male of *Strongyloides stercoralis*. Again, undue space of 3 pages is given to *Heterodera marioni* (*radicicola*), the egg of which is merely fortuitous in the faeces.

To the reviewer, filariasis is naturally rather a hallowed subject and possibly on that account he is apt to be rather sensitive about the history of this important nematode, but in the case of the non-periodic form, referred to as

"Filariasis in the Samoan area", the story is positively misleading, while the photograph of that handsome mosquito, *Aedes scutellaris* (Fig 163), is badly fogged. The crowning achievement is undoubtedly to be found in the description of the Cestoda which occupies alone 72 pages. Here great attention is paid to the rarer forms which are accidental in man. Thus twelve illustrations and as many pages are devoted to *Inermicapsifer cubensis* which has hitherto not been recorded except from Cuba, and the account is based upon specimens derived from some 75 cases.

Raillietina quitensis was described by Luis A LEÓN in 1938, in Ecuador, where some human infections have been recorded, it is another rare species but no attempt has been made to unravel the obscure life history of either of these two cestodes or to discover their normal hosts. In a similar vein, great attention has been paid to *Hymenolepis* which appears to be a common intestinal parasite in Cuba. In direct contrast to this prolixity that section devoted to diseases caused by spirochaetes, viruses, bacteria and also those due to arthropoda constitutes an absolute anticlimax, and this vast amount of information which should require a volume on its own is dismissed in 65 pages.

In this review we have endeavoured to be fair in appraising the virtues of a notable production and at the same time pointing out some imperfections for the attention of the conscientious and diligent authors of this work on

parasitology. It is hardly necessary to add that the general finish and format of this book could hardly be bettered.

P. Manson-Bahr

DEBOIS, Albert (Directeur de l'Institut de Médecine tropicale d'Anvers etc. & VAN DEN BERGHE Louis [Directeur de l'Institut pour la Recherche Scientifique en Afrique Centrale etc.] *Les maladies des pays chauds. Symptômes, diagnostic et traitement.* (The Diseases of Hot Countries) pp. xvi+489 100 figs. & 91 graphs. 1947 Paris: Masson et Co. Editeurs, 120 Boulevard Saint-Germain.

This latest addition to the rapidly growing family of small books on tropical diseases deserves a hearty welcome from every French-reading medical man in the tropics. The authors state that their aim has been to provide in concise form reliable information with regard to the diagnosis and treatment of the chief diseases of hot countries. It can be said at once that they have achieved their object in a very successful manner. The book is well written and attractively produced. The subject matter has been carefully chosen and the most exacting critic will find it difficult to discover errors in the text. The illustrations are excellent—they consist of 100 reproductions of photographs nearly all of which are original.

Diseases which are not appreciably more common in hot than in cool countries have been excluded—for example the brucelloses and spirochaetosis—but fortunately the authors have not adhered slavishly to their principle. Including exclusively diseases of hot climates otherwise they could not have admitted the helpful description of louse-borne typhus—a disease which flourishes specially in cold weather.

The classification—or rather the order of arrangement—of the diseases is based on their clinical features and on the regions of the body that are affected, not on the nature of the causative agents. This classification will doubtless arouse criticism in some quarters but it can be defended on the grounds of convenience and helpfulness to the doctor.

The scope of the book can best be shown by a summary of the content: the figures in brackets show the approximate number of pages allotted to the various subjects.

I. *Geographical Distribution* (7). II. *Climatology* (12), including five pages on diseases caused in heat. III. *Commonest Diseases in the Tropics* (24). IV. *General Infections* (173) including sleeping sickness (36) Chaga disease (9) visceral leishmaniasis (10) malaria (48) blackwater fever (10) lapping fevers (11) rickettsial diseases (22) plague (10) yellow fever (10) dengue (3) and three days fever (3). V. *Intestinal Diseases* (78) including bacillary dysentery (8) amoebic dysentery and liver abscess (17) cholera (4) schistosomiasis (18) hookworm disease (9) and other helminthic diseases of the intestines (14). VI. *Skin Diseases* (92) including leprosy (22) mycoses (10) yaws (9) and filarial diseases (38). VII. *Injuries caused by Animals and Plants* (9) including snake-bite (4). VIII. *Flies and Mosquitoes* (20).

Five pages are given up to a useful description of certain modern drugs but many readers will grudge the allotment of eight pages to a series of diagrams showing the chemical structure of some important substances. The appendix of 16 pages dealing with some common and important laboratory methods will be very helpful to medical men working in isolated outposts.

The authors willingly admit that as professors at the *Belgian Institut de Médecine tropicale d'Anvers* their personal experience and special knowledge are related chiefly to African diseases but they claim that they have maintained a cosmopolitan outlook on the subject. On the whole this claim is justified.

though the allotment of only four pages each to cholera and snake-bite would be considered inadequate for workers in countries in which these diseases are important

The authors pay a graceful tribute to "*L'Excellent Tropical Diseases Bulletin*" which readers are advised to consult for detailed and up-to-date information

An English version of the book is said to be in the course of preparation

In one respect the book has been fortunate in the time of its appearance, important advances in connexion with treatment have been exceptionally numerous during the past two or three years, and all but the very latest have been incorporated by the authors

John W D Megaw

ROCKEFELLER FOUNDATION INTERNATIONAL HEALTH DIVISION Annual Report 1947 pp 1+209, 13 figs on 6 pls New York 49 West 49th Street

To read the Annual Report of the International Health Division of the Rockefeller Foundation is to take a tour from Chile to China, to learn much about a mixture of diseases from Bwamba fever (undoubtedly the most common virus disease of man in West Africa, where there is also evidence of Japanese B encephalitis) to diphtheria, and to see the form of progress in subjects varying from Health Insurance to the training of Sanitary Engineers. That diverse mixture is the measure of the influence of the International Health Division, for none of the subjects is taken up lightly or without altering our general conception of the subject studied

As is common, major parts of the report are devoted to yellow fever and malaria, the first includes an interesting account of serological studies of the virus, a statement of the epidemiology of jungle yellow fever in East Africa which most people will find illuminating, and much incidental matter of which the most intriguing is the application of nuclear physics to tracing the movements of mosquitoes, tagged in the larval stage by exposure to radio-phosphorus or radio strontium. The section on malaria includes notes on the physiology of the parasite and accounts of work in several countries, of which the most interesting is perhaps the story of the effort to eradicate from Sardinia the anophelines which carry malaria. Influenza also receives considerable notice with an account of the relationship of the two viruses, their epidemiology, efforts to produce active immunization and unsuccessful ones to produce clinical cure

There is a short but critical and thoughtful article on Medical Care. A writer who has surveyed trends in twelve countries emphasizes the increasing recognition of the importance of nutrition, housing, recreation, education and social security in the general field of medicine, and the necessity for Governmental interference if they are to receive proper attention, including the removal of economic barriers to adequate medical service. The defects in planning which he considers to be common are failure (except in Australia) to consider the types of staff required and the training needed to put the plans into practice; planning for the cure of rather than the prevention of sickness, and inadequate provision for mental and rehabilitation services and the care of chronic sick. As minor defects he lists lack of appreciation of advances in other countries, and the disregard except in Canada and U.S.A., of the need for auxiliary medical staff. The pleasure of reading the report is only mildly marred by disappointment that he was kept in ignorance of the fact that there is standardized training controlled by a national organization for some auxiliaries in Britain

A constructive proposal the R part advocates a revolutionary change or re-orientation in medical education: the provision of Health Centres, where a association with teaching hospital and the extension by medical school of their facilities to include the care of the health of a designated community of some 100,000 to 200,000 population.

There are many other subjects which could be mentioned with much appropriateness in a review. It is a record of one year of highly constructive work.

C. Macdonald

Smart, John (M.A. D.Sc. Dept. of Zoology, University of Cambridge).
A Handbook for the Identification of Insects of Medical Importance. With Chapters on Fleas by Dr. Karl Jordan F.R.S. and on Arachnids by R. J. Whittick B.Sc. 2nd Edition. pp. xi+293 13 pl. (3 coloured) & 174 fig. 1948. June. London: British Museum (Natural History). 20s.

The first edition of Dr. Smart's book was published in 1943 (see this Bulletin 1944: 41-329) and the call within four years of publication for a second impression and a second edition proves the continued need for an authoritative but not too lengthy guide to arthropods of medical importance. The present edition has been increased by some 30 pages. It contains a number of new illustrations: the latter include an original drawing of *IT* (not *IT* draws) to replace the previous and much less satisfactory illustration borrowed from Castellani and Chalmers. The section on *Glyptotendipes* has been lengthened to include fresh material concerning the geographical distribution and vegetative associations of different species of larvae. Dr. Kenneth M. Usher has revised the chapter on Arachnids and the life-cycle of *Sarcoptes scabiei* is now described as similar to that of *Notoedres* in that all stages (except mature female) may inhabit small, almost invisible moulting pocket in the most superficial layers of the stratum corneum. The chapter on anophelines contains a notable *Plasmodium* vector ranking in order of importance contributed by Mr. H. S. Leeson. The most comprehensive alteration occurs in the section on *Beetles*, which Dr. Karl Jordan has re-written and extended by some 11 pages. Finally, a very welcome improvement is the much more comprehensive index added at the time of the second printing.

The second edition did the first contain descriptions of such genera as *Gasterophilus*, *Hypoderma*, *Melophagus* and *Hemaphysalis*. The inclusion of insects so seldom injurious to man in a book otherwise solely concerned with medical entomology seems unnecessary.

The first edition was published at 15/-; the second edition maintains the high standard of production of its predecessor and is printed on a more substantial paper at the remarkably low price of 20s. R. M. Gordon

TROPICAL DISEASES BULLETIN

Vol 46]

1949

[No 4

SUMMARY OF RECENT ABSTRACTS*

III MALARIA

[Continued from p 204]

Treatment

General—The Expert Committee on Malaria of the World Health Organization has issued reports of its first and second sessions (pp 389, 948). The first sums up much modern work on antimalaria drugs and DDT. In the second a particularly important feature is a statement of the dosages advised for the drugs in common use (which are set out in detail in the abstract).

A series of tests of potential antimalarial drugs was carried out on 500 prisoners in the United States, most of the drugs were members of the 8-aminoquinoline group. ALVING *et al* (p 951) explain that the Chesson strain of *P vivax* (with high relapse rate) was used, with *A quadrimaculatus*. In the first paper (JONES *et al*, p 951) it is shown that pamaquin, pentaquine and two other drugs may act as true prophylactics, but that they did not protect all subjects, they are, however, too toxic for this purpose. Another compound, SN-10,275 is also too toxic for use (PULLMAN *et al*, p 952). Serious reactions occurred with pentaquine at a dose of 120 mgm of the base each day, along with quinine (CRAIGE *et al*, p 953). In doses of 30 or 60 mgm of base daily, with quinine, however, the effect on fever and on the relapse rate was very good, even in heavy infections. Pentaquine should be administered only under close medical supervision, and the daily dose should not exceed 60 mgm, it should not be used for prolonged suppression (ALVING *et al*, p 953).

ALVING *et al* (p 954) found that the curative properties of pamaquin are shared by several analogues, but no definite conclusions can be drawn as to the specific molecular configuration required in a curative drug. Régimes which produce a high percentage of cures tend to prolong latent periods in those they fail to cure.

Under the conditions of the experiment, chloroquine proved superior to quinine and mepacrine, the dosage was 2.0 gm in one week (PULLMAN *et al*, p 955). It is safe if given in recommended doses, and ALVING *et al* (p 956) suggest 1.5 gm of the base [2.5 gm of the diphosphate] in three days for the

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 v 45. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

cure of attacks of *P. vivax* or *P. falciparum* malaria, and 0.3 gm. (0.3 gm. diphosphate) each week for suppression.

Results reported by JONES *et al.* (p. 835) indicated that paludrine was not as effective as mepacrine or chloroquine in terminating acute attacks, but that it was valuable and had only negligible toxic effects. It had no synergic action with either quinine or pamaquine.

In a second series of studies on chemotherapy in human malaria, SWANSON *et al.* (p. 836) worked with the McCoy strain of *P. vivax*, which is more susceptible than the Chesson strain to quinine. They show that blood forms derived from blood inoculation, and those from sporozoite infection are equally susceptible to quinine. The effect of quinine is correlated with its concentration in plasma, but is independent of the degree of parasitaemia. Similar results were observed (EARLE *et al.*, p. 857) when *P. falciparum* infections were induced by infection of infected blood, and therapeutic response to quinine was correlated with duration of treatment and with plasma concentration. There was some difference in the response of another strain of *P. falciparum*. The physiological disposition and antimalarial activity of the cinchona alkaloids were studied by TAGGART *et al.* (p. 958) who showed that plasma concentrations after identical doses varied widely in different subjects, and between the different alkaloids. EARLE *et al.* (p. 959) discuss the metabolism of cinchonine.

The antimalarial action of quinaquine (mepacrine) in *P. vivax* and *P. falciparum* infections was studied by TAGGART *et al.* (p. 960) and of chloroquine and other aminoquinolines, and of pamaquin by BRILLNER *et al.* (pp. 961-963) with results similar to those of other investigations, while ZUCKER *et al.* (p. 962) report on the physiological disposition of pamaquin, and EARLE *et al.* (p. 962) on its effect on human red blood cells. Details of these findings cannot satisfactorily be further abstracted.

EARLE *et al.* (p. 963) reached the conclusion that paludrine is extremely effective against the McCoy strain of *P. vivax* but the Costa strain of *P. falciparum* was more resistant. Paludrine is the most active suppressive agent yet described in *P. vivax* malaria.

ANDREWS and CORRYATZER (p. 396) show that cinchonidine is metabolized more quickly than cinchonidine or quinine in man.

MAIER (p. 971) shows that even in patients with acute dysentery quinine and mepacrine are absorbed normally.

MAIER *et al.* (p. 880) found little difference in the results of treatment of *P. falciparum* malaria with mepacrine (3.6 gm. in 6 days) and with quinine (210 grains in 6 days). Nervous symptoms were observed in a few patients on mepacrine.

JAILER *et al.* (p. 575) refer to the fact that excretion of quinine is increased if the urine is acid, and show that the same is true of mepacrine, chloroquine and pantoquine. Administration of ammonium chloride to render the urine acid, may therefore be useful if there are symptoms of drug toxicity.

LEVES (p. 33) reports on the experience of the Army malaria research team in relation to treatment of *P. vivax* malaria with quinine, mepacrine, pamaquin and paludrine. He discusses their rapidity of action, the stages of the parasites on which they act, and their effects on relapses. For details the original book should be consulted.

MOORE (p. 1053) has summed up recent developments in the treatment of *P. vivax* infections. Paludrine and chloroquine are about equally effective in suppression. For the acute attacks quinine (or paludrine) and pamaquin given concurrently are very satisfactory but quinine and pantoquine (which is rather less toxic than pamaquin) together are probably better in reducing the relapse rate.

WINCKEL (pp 144, 145) discusses the continuing value of quinine in malaria, and suggests that the hydrochloride should be used in place of the too acid bishydrochloride for intramuscular injection, thus reducing the amount of necrosis and the chance of infection.

WINCKEL (p 303) demonstrates that there is no good reason to think that the use of quinine in pregnancy leads to congenital defects of the ear or eye of the foetus.

MAMOU (p 237) reports a case of intolerance to quinine, two intramuscular injections of 1 gm gave rise to haemorrhagic purpura.

There is, in various animal tissues, especially the liver, an enzyme which acts on quinine, converting it to the 2-hydroxy derivative CHEN (p 397) shows that both mepacrine and pamaquin inhibit the conversion of quinine, probably by acting on the enzyme.

COATNEY *et al* (p 680) show that quinine sulphate in doses of 0.5 gm daily for 4 days before infection with *P. vivax* and for 21 days thereafter suppressed the early primary attack, but that the attack occurred after an incubation period of 260-332 days. Doses of 0.25 gm for the same period usually failed, and larger doses not continued beyond 6 days after infection also failed.

STRAHAN (p 574) describes the treatment, based on quinine, given to the malnourished prisoners of war near Singapore during the Japanese occupation. For very heavy infections quinine was given by intravenous drip regardless of the clinical condition, at the rate of 2 gm (in 3-4 litres) in 24 hours, and continued, if necessary, for several days. The rate of flow was 30-40 drops per minute.

FIELD *et al* (p 577) gave neoarsphenamine, in addition to quinine, to patients with *P. vivax* malaria in internment camps near Singapore, but did not observe any benefit from the neoarsphenamine.

CHEN and GEILING (p 490) show that quinine and plasmoquine show a synergistic action as regards toxicity and therapeutic action, and the same is true of quinine and pentaquine. Quinine and atebryn, and atebryn and plasmoquine, act independently.

SPICKNALL and TERRY (p 753) report good results from combined quinine-plasmoquine or quinine-pentaquine treatment in relapsing *P. vivax* malaria.

Mepacrine, etc—MACHELLA *et al* (p 304) have shown that intravenous mepacrine in dilute solution (1 in 1,000 in saline) is well tolerated up to a dose of 1.0 gm, but should be given by the drip method over a period of 3-4 hours.

PARMER (p 1058) shows that there is a considerable amount of mepacrine in the bone marrow of rabbits on the 4th day after administration, although the blood is almost free. There is, however, no apparently direct relationship between mepacrine and aplastic anaemia, which is probably a matter of idiosyncrasy.

JAILER *et al* (p 681) have investigated the effect of acidosis and anoxia on concentrations of mepacrine and chloroquine in blood. CO₂ acidosis increases the proportion found in plasma and red cells as against the proportion in the tissues, but anoxia has no such action.

SINGH (p 1059) reports 83 cases of atypical lichen planus in patients who had taken mepacrine, and describes the condition, in most cases the onset was acute. He did not see this disease in persons who were not taking suppressive mepacrine, and the severity seemed to be related to the amount stored in the skin.

PERR (p 398) discusses mepacrine psychoses, describing 23 cases seen in the Middle East. Other factors than mepacrine may have been important—emotional stress, battle stress or alcoholism. Most of the cases arose after therapeutic doses had been given (3.4 gm in 6 days). The most frequent

symptoms were schizophrenic and manic in type, with incoherence and a change in behaviour in the early stages.

Two cases of fugue after administration of mepacrine are recorded by MACDONALD (p. 237).

HOEBLER (p. 238) reports that a number of toxic nervous symptoms occurred in a group of volunteers (not in a malarial region) who took either the usual suppressive doses of mepacrine for two weeks or rather high therapeutic doses for a few days. This is not a usual finding.

Four cases of mepacrine psychosis are described by PARAJOTY (p. 237).

EL-DIK NOUR EL DIK (p. 1060) reports a few cases of mepacrine psychosis. Instead of giving the acridine drug Italcina in daily doses of 0.3 gm. for 5-7 days, BUONOMINI and MOTTA DIANA (p. 399) used 0.5-0.8 gm. each day for 4 days for both *P. vivax* and *P. falciparum* infections, with advantage.

Paludrine—A general review of paludrine was published in 1947 by FIELD (p. 861).

GREEN and AVDEYEV (p. 491) describe the general pharmacology of paludrine. MULLICK and GUPTA (p. 755) have given paludrine intravenously without serious toxic symptoms.

Paludrine acts on the dividing nucleus of early schizonts of *P. vivax*. Gametocytes of *P. vivax* or *P. falciparum* if enough of the drug is present in the blood taken up by the mosquito, fail to develop beyond the stage of encystment and MACKERRAS and ESCOFFER (p. 305) have shown that for 10 days after treatment is stopped there may be enough paludrine to affect development, but not after the 12th day.

MARSHALL (p. 49) suggests that paludrine probably acts by inhibiting the oxidation processes of the malarial parasite and quotes the evidence on which he bases his opinion.

SHUTZ and MANNON (p. 578) have examined the action of paludrine on the gametocytes of *P. falciparum* and show that mosquitoes fed upon a patient up to 7 days after cessation of paludrine failed to become infected. This confirms earlier work by FAIRLEY and his team.

In India 6 trials of paludrine were conducted by independent workers whose reports are reviewed together (p. 880). A comment on the whole series is offered by ARKIDIS (p. 882) who shows that the disease was microscopically diagnosed in all cases. 1,283 *P. falciparum*, 491 *P. vivax*, 88 *P. malariae* and 59 mixed. Acute *P. falciparum* infections responded better than *P. vivax* and the response of *P. malariae* was often delayed. Paludrine is as effective against Indian as against other strains, and a single dose of 0.3 gm. usually suffices for clinical cure. This dose could be used in the hospital and dispensaries of India and relapses could be treated as they arise or 0.1 gm. could be taken once or twice each week.

In a trial of paludrine in cases of subtertian and benign tertian malaria in India ARKIDIS *et al.* (p. 233) found that a single dose of 300 mgm. was enough for a clinical cure of an attack, and that there was no advantage in repeating the dose for several days or in giving mepacrine.

DE and DUTTA (p. 34) have treated a small number of patients with paludrine and report favourably on it. Similar studies are reported by CHAUDHURI and RAI CHAUDHURI (p. 35) and by PARKER and BOGHIANI (p. 76). In these three papers both *P. vivax* and *P. falciparum* cases are recorded, and various regimens were used.

In India GHOSH and GHOSH (p. 147) also report favourably on paludrine.

VISWANATHAN and BAILEY (p. 754) think that paludrine may take its place in the hands of lay village officers for distribution in India. They obtained good results in treatment and suppression with relatively low doses.

Treatment of *P falciparum* malaria in Sardinia with paludrine 0.3 gm daily for 10 days with weekly administration thereafter, was very successful in most cases, though there were some attacks after the first 5 days of treatment. BETTINI (p 861) also reports good results in a few *P vivax* and *P malariae* cases.

WALLS (p 972) thinks that in Sierra Leone paludrine should be taken in a dose of 0.1 gm each day, for effective suppression. He prefers it to other drugs, in suppression or treatment, but in doses greater than have usually been advocated.

Paludrine promptly suppressed symptoms in 89 per cent of patients (mostly with *P vivax*) when 0.2 gm was given in a single dose, and in 97 per cent with 0.4 gm (PINTO, p 400).

WOODRUFF (p 240) found that a single dose of 100 mgm paludrine was enough to control attacks of *P vivax* malaria (mostly relapses) in prisoners of war returned from the Far East, and that 100 mgm taken once each week for 6 months prevented relapse in 18 of the 20 patients for 6 months after the last dose.

ANDREWS *et al* (p 491) found that the relapse rate was about the same after short therapeutic courses of mepacrine and paludrine, but that when a small dose of paludrine was given each week for 6 months after a therapeutic course, the relapse rate was reduced.

SCHNEIDER and MÉCHALI (p 865) in North Africa found only slight differences in effect between paludrine, nivaquine and nivaquine B, but metachloridine gave inconstant results.

Chloroquine, etc—The dose of chloroquine advocated in the *Bull U S Army Med Dept* (p 37) is 5 doses (each 0.5 gm) in 4 days (total 2.5 gm), and for suppression 0.5 gm once each week. Attacks are usually promptly brought under control with this dosage, and in most *P vivax* cases the patients become afebrile and free from parasites within 24–48 hours. There are some mild reactions—pruritus, anorexia, vertigo, etc.

WARTHIN *et al* (p 753) have found that in treatment and suppression of *P vivax* infections chloroquine is as effective as mepacrine, but it is no more effective than mepacrine in preventing relapses.

YOUNG and EYLES (p 680) show that chloroquine clears the blood of *P malariae* (in the doses used) more quickly than mepacrine, quinine or totaquine, it also acts more quickly on *P vivax* than on *P malariae*.

Chloroquine was very effective in cutting short blood-induced *P vivax* malaria when given in doses to a total of 2.5–3 gm in 48 hours (KIERLAND and MCCREIGHT, p 400).

Aralen is another name for chloroquine, KAMAL and ABDEL MESSIH (p 38) gave it in dosages of 2.5 gm in 3 days or 0.5 gm every 4 hours to a total of 2 gm. It was effective in both *P vivax* and *P falciparum* infections.

LUCENA (p 1061) reports favourably on Aralen (which is chloroquine diphosphate) in *P vivax* and *P falciparum* infections in Brazil.

In high doses chloroquine will produce toxic effects in rats, but FITZHUGH *et al* (p 973) show that these doses are higher than would be used in man, the general inference was that it is slightly less toxic than mepacrine for rats.

CRAIGE *et al* (p 868) report two cases in which, during a long course of chloroquine administration, a cutaneous eruption was seen which resembled that occasionally caused by mepacrine.

HALAWANI *et al* (p 681) write that Nivaquine C is a potent antimalarial drug which does not produce toxic symptoms in the doses they propose (1.8 gm in 5 days). It is mainly active against schizonts, their tests were made with *P vivax*.

symptoms were schizophrenic and manic in type with insomnia and a change in behaviour in the early stages.

Two cases of fugue after administration of mepacrine are recorded by MACDONALD (p. 237).

HOODLEY (p. 238) reports that a number of toxic nervous symptoms occurred in a group of volunteers (not in a malaria region) who took either the usual suppressive doses of mepacrine for two weeks or rather high therapeutic doses for a few days. This is not a usual finding.

Four cases of mepacrine psychosis are described by PARAMJOTRY (p. 237).

EL DIX NOUR EL DIX (p. 1067) reports a few cases of mepacrine psychosis.

Instead of giving the acridine drug Italcina in daily doses of 0.7 gm. for 5-7 days, BUONOMINI and MOTTA DIANA (p. 309) used 0.5-0.6 gm. each day for 4 days for both *P. vivax* and *P. falciparum* infections, with advantage.

Paludrine—A general review of paludrine was published in 1947 by FIELD (p. 861).

CHEW and ANDERSON (p. 491) describe the general pharmacology of paludrine.

MULLICK and GUPTA (p. 755) have given paludrine intravenously without serious toxic symptoms.

Paludrine acts on the dividing nucleus of early schizonts of *P. vivax* gametocytes of *P. vivax* or *P. falciparum* if enough of the drug is present in the blood taken up by the mosquito, fail to develop beyond the stage of encystment, and MACKERRAS and ESCOFFER (p. 305) have shown that for 10 days after treatment is stopped there may be enough paludrine to affect development, but not after the 12th day.

MARSHALL (p. 49) suggests that paludrine probably acts by inhibiting the oxidation processes of the malaria parasite and quotes the evidence on which he bases his opinion.

SAUTY and MARYON (p. 578) have examined the action of paludrine on the gametocytes of *P. falciparum* and show that mosquitoes fed upon a patient up to 7 days after cessation of paludrine failed to become infected. This confirms earlier work by FAIRLEY and his team.

In India, 6 trials of paludrine were conducted by independent workers whose reports are reviewed together (p. 862). A comment on the whole series is offered by AFRIDI (p. 862) who shows that the disease was microscopically diagnosed in all cases: 1,285 *P. falciparum*, 481 *P. vivax*, 68 *P. malariae* and 59 mixed. Acute *P. falciparum* infections responded better than *P. vivax* and the response of *P. malariae* was often delayed. Paludrine is effective against Indian as against other strains, and a single dose of 0.3 gm. usually suffices for clinical cure. This dose could be used in the hospital and dispensaries of India, and relapses could be treated as they arise or 0.1 gm. could be taken once or twice each week.

In a trial of paludrine in cases of subtertian and benign tertian malaria in India AFRIDI *et al.* (p. 279) found that a single dose of 300 mgm. was enough for a clinical cure of an attack, and that there was no advantage in repeating the dose for several days, or in giving mepacrine.

DE and DUTTA (p. 34) have treated a small number of patients with paludrine and report favourably on it. Similar studies are reported by CHAUDHURI and RAI CHAUDHURI (p. 35) and by PARKER and BOGHIANI (p. 76). In these three papers both *P. vivax* and *P. falciparum* cases are recorded, and various regimens were used.

In India GHOSH and GHOSH (p. 147) also report favourably on paludrine. VISWANATHAN and BULLY (p. 734) think that paludrine may safely be left in the hands of lay (illage officers for distribution in India: they obtained good results in treatment and suppression with relatively low doses.

GARTRELL and KIKER (p 760) go into the detail of the engineering problems involved. The treatment of the reservoir margins in the Tennessee Valley involves two methods — deepening and filling, diking and dewatering. Dewatering involves the use of pumps and recurring expenditure until the deepening and filling procedure is carried out. The subject is discussed by SIMMS and KIKER (p 1061).

NEWBOLD and COCHRANE (p 307) have devised an automatic siphon for antimalarial work, which has given good results in the West Indies. Details must be sought in the original.

PRATT (p 977) has studied the plant communities of Porto Rico and their relation to the breeding of *A. albimanus* and other species, he discusses the control measures suitable for the various conditions.

GRAY (p 309) has written an account of some of the important mosquitoes of Japan, and of methods of control.

Malaria in Malaya is described in a book by SANDOSHAM (p 1045), who has paid attention to control, but in the period before DDT, and the latest drugs, were available.

Insecticidal methods — MISSIROLI (p 151) gives an account of the campaign undertaken against mosquitoes in Italy, where reliance has been placed on spray-painting of houses with DDT. The figures quoted show striking reduction of mosquitoes, of cases of malaria, and of deaths from malaria and from all causes. The reduction in deaths from all causes is probably a result of the reduction of enteric diseases consequent upon the wide destruction of house flies achieved by DDT.

AZIZ (p 152) gives a detailed account of the work done during 1946 in the *Anopheles*-eradication scheme for Cyprus. Only part of the island was attempted in that year, but the work is to be extended later. DDT in oil was used as a larvicide, and as a residual spray in houses, pyrethrum was also used. The results were satisfactory though complete eradication was not achieved in this first year. The local anophelines are described.

The enormous control scheme undertaken in Greece in 1946, with DDT, is described by VINE (p 492). For hibernating mosquitoes residual spraying was practised with a 5 per cent DDT at 220 mgm per square foot, and for larvicidal work also 5 per cent DDT was used. Aircraft were used for marshes. These applications were made time after time from spring to autumn, and although comprehensive statistical data are not available, the amount of malaria was much less than the expected amount, some 80 per cent of the population at risk having been protected. In addition, flies and sandflies almost disappeared, but bees were little affected after blossom time. The effects of DDT on the 6 000 labourers were negligible.

LIVADAS *et al* (p 758) report on a special investigation they made to assess the results of this programme. They found spleen rates reduced to half the previous figures and parasite rates to one tenth, in unprotected areas the parasite rate had not declined.

LIVADAS (p 758) describes the campaign of the following year, when by house spraying and larvicidal methods, all with DDT, over 4 million people were protected. The mosquitoes were again controlled, but the house flies much less so.

A big programme of house spraying with DDT in the Veneto Provinces of Italy was followed by a great reduction in malaria (SEPULCRI, p 758).

BERBERIAN (p 870) has used 5 per cent DDT in kerosene with success as a residual spray and as a larvicide, in Lebanon where the vectors are *A. sacharovi* and *A. superpictus*.

AFRIDI and BHATIA (p 493) have used DDT as a residual spray near Quetta, India, with success. At a concentration of 25–38 mgm per square foot there

the local troops were good except in Liberia, and they had the desired effect in preventing transport of *A. gambiae*. In comment TREDDER remarks that application of insecticide to aircraft as the sole means of prevention is unreliable. He also points out some inaccuracies in the original paper.

The whole subject of malaria control in West Africa by coastal swamp drainage has been dealt with in a monograph written by GILROY (p. 1043). This should be studied in the original. It is an account of war-time work, and is indispensable to anyone undertaking a similar task.

WALTON (p. 401) in a most important paper has made a close examination of the effects of the extensive and careful larvicide campaign carried on in Freetown Sierra Leone during the war. The number of female *A. gambiae* caught in houses was greatly reduced and on average there was only one infected *A. gambiae* in every 14th room in 18 months. This would mean that only one person in 58 would receive an infective bite in the same period. A figure illustrates the enormous reduction that has taken place in the parasite rate of children during this period, and even among those who became infected the author thinks that most did so when they were outside the controlled area, and gives reasons for his opinion. The number of parasites in the blood of infants increases with age up to ~3 years as does the number infected; thereafter both decline. Comparison with malaria incidence outside the controlled area, and in Freetown as recorded in 1931 shows that great reduction has been effected.

WALTON (p. 1082) has been able to correlate the number of infective bites received each year by children in Freetown, with the parasite rate. He makes the point that reduction of parasite rate to 5 per cent. usually considered a satisfactory result of control, may reduce the children's immunity without any appreciable reduction of the disease. In comment TREDDER considers some possible implications of this view.

MACDONALD (p. 239) has written a long pamphlet on malaria control (for the benefit of laymen and medical men in India (particularly those connected with estates) in which he pays special attention to the new insecticides and drugs now available.

For the control of breeding of Indian anophelines such as in still water in association with various water plants. RAO and RAMAKRISHNA (p. 41) show that manual removal of the plants leads to overgrowth of algae but that this can be avoided by planting the common aquatic herb *Ottelia* (worden). The best prevention is the planting of vegetables on the beds of the tank when they are dry in summer. This seems to render the soil sterile when the water accumulates again.

NAGENDRA (p. 41) writes of the value of dry leaf packing of streams for control of mosquito breeding.

A Committee of engineers and malariologists in India (p. 57) has laid down the principles which should be observed, in road and railway construction so that the risk of malaria may be avoided.

The extensive and carefully planned system of malaria prevention which is now routine in the Tennessee Valley is discussed by BISHOP and HIRSH (p. 759). They point out that many of the engineering features which help to prevent the breeding of anophelines are built in at the stage of construction of the reservoirs. Water level manipulation is now well understood, and together with shore-line maintenance and improvement almost makes the use of larvicide unnecessary. There are sometimes needed however, and DDT has supplanted Paris green; it is also used as residual spray in houses where it gives better protection than routine gauze screening. A full account of malaria control on impounded water has been published by the United States Public Health Service and the Tennessee Valley Authority (p. 822).

GARTRELL and KIKER (p 760) go into the detail of the engineering problems involved. The treatment of the reservoir margins in the Tennessee Valley involves two methods — deepening and filling, diking and dewatering. Dewatering involves the use of pumps and recurring expenditure until the deepening and filling procedure is carried out. The subject is discussed by SIMMS and KIKER (p 1061).

NEWBOLD and COCHRANE (p 307) have devised an automatic siphon for antimalarial work, which has given good results in the West Indies. Details must be sought in the original.

PRATT (p 977) has studied the plant communities of Porto Rico and their relation to the breeding of *A. albimanus* and other species, he discusses the control measures suitable for the various conditions.

GRAY (p 309) has written an account of some of the important mosquitoes of Japan, and of methods of control.

Malaria in Malaya is described in a book by SANDOSHAM (p 1045), who has paid attention to control, but in the period before DDT, and the latest drugs, were available.

Insecticidal methods — MISSIROLI (p 151) gives an account of the campaign undertaken against mosquitoes in Italy, where reliance has been placed on spray-painting of houses with DDT. The figures quoted show striking reduction of mosquitoes, of cases of malaria, and of deaths from malaria and from all causes. The reduction in deaths from all causes is probably a result of the reduction of enteric diseases consequent upon the wide destruction of house flies achieved by DDT.

Aziz (p 152) gives a detailed account of the work done during 1946 in the *Anopheles*-eradication scheme for Cyprus. Only part of the island was attempted in that year, but the work is to be extended later. DDT in oil was used as a larvicide, and as a residual spray in houses, pyrethrum was also used. The results were satisfactory though complete eradication was not achieved in this first year. The local anophelines are described.

The enormous control scheme undertaken in Greece in 1946, with DDT, is described by VINE (p 492). For hibernating mosquitoes residual spraying was practised with a 5 per cent DDT at 220 mgm per square foot, and for larvicidal work also 5 per cent DDT was used. Aircraft were used for marshes. These applications were made time after time from spring to autumn, and although comprehensive statistical data are not available, the amount of malaria was much less than the expected amount, some 80 per cent of the population at risk having been protected. In addition, flies and sandflies almost disappeared, but bees were little affected after blossom time. The effects of DDT on the 6 000 labourers were negligible.

LIVADAS *et al* (p 758) report on a special investigation they made to assess the results of this programme. They found spleen rates reduced to half the previous figures and parasite rates to one tenth, in unprotected areas the parasite rate had not declined.

LIVADAS (p 758) describes the campaign of the following year, when by house spraying and larvicidal methods, all with DDT, over 4 million people were protected. The mosquitoes were again controlled, but the house flies much less so.

A big programme of house spraying with DDT in the Veneto Provinces of Italy was followed by a great reduction in malaria (SEPULCRI, p 758).

BERBERIAN (p 870) has used 5 per cent DDT in kerosene with success as a residual spray and as a larvicide, in Lebanon where the vectors are *A. sacharovi* and *A. superpictus*.

AFRIDI and BHATIA (p 493) have used DDT as a residual spray near Quetta, India with success. At a concentration of 25–38 mgm per square foot there

was apparently a reduction in the incidence of malaria the anophelines concerned were *A. superpictus* & *calliciax* and *A. stephensi*.

PURI *et al.* (p. 154) have published four useful papers, in which they show the value of DDT in oil or turpentine as a larvicide in ricefields, pits and streams, and as a residual spray (especially against *A. minimus* and *A. superpictus* in Bengal and Baluchistan respectively). They give details of amounts used.

In an investigation of the effect of spray treatment of African houses with pyrethrum or DDT in kerosene Muirhead Thomson (p. 405) has shown that though the numbers of *A. gambiae* and *A. moides* caught in houses after treatment is reduced, this is rather due to the fact that they are driven to rest outside after feeding even more than they normally do. Low house catches therefore, do not necessarily indicate heavy mortality or reduction of biting activity: these mosquitoes still seek human blood, but they do not normally rest much within the houses and a heavy dose of kerosene on the wall has a repellent effect.

In field trials in Sierra Leone DAVIDSON (p. 157) has demonstrated that Gammaxane (0.5 per cent. solution at 10 mgm. per square foot of surface) used as a residual spray is very effective in reducing for 6 months the mosquito population in houses (*A. gambiae*, *A. moides* & *A. fuscipes*). He found, however (p. 158) that in the group of villages sprayed there was little change in the malaria rate as a result of these measures.

TOYANING *et al.* (p. 241) conducted a campaign of residual DDT spray in a malarious district of Mauritius where *A. fuscipes* is the chief vector. They demonstrated great reduction in the numbers of *A. fuscipes* caught in the sprayed houses after 3 treatments of 178, 112 and 150 mgm. DDT per square foot, and they found some reduction in the parasite rate of the people.

NAIR (p. 1083) reports marked reduction in the anopheline vectors (especially *A. latifer*) in a town in Malaya after DDT residual spray had been used three times in three months. The effect on spleen rates and parasite rates was also good.

WATERHOUSE and VINESTON (p. 975) have tested pyrethrum and other sprays against various mosquitoes including *A. punctulatus*, *A. tritaeniorhynchus* and show that a spray containing 0.14 per cent. pyrethrum gives good knockdown. This was used by the Australian Army authorities until the advent of DDT which was used to reinforce the pyrethrum as an all-purpose spray.

BING *et al.* (p. 45) show that DDT residual spray at 100 mgm. per square foot was effective in reducing the numbers of *A. punctulatus*, *A. tritaeniorhynchus* and *A. subpictus* found in houses in villages of New Guinea even after 4 months the numbers were only 5 per cent. of the numbers found in adjacent unsprayed villages.

LEST (p. 682) shows how effective a combined campaign of DDT residual spray and DDT in kerosene as a larvicide was against *A. farauti* in Espiritu Santo, New Hebrides, during the war.

MCCATLEY *et al.* (p. 700) have shown that for DDT to be effective against *A. quadrimaculatus* as a residual spray in houses it must be applied not only to likely mosquito resting places (under-sides of furniture etc.) but also to wall and ceilings as a whole.

FLETCHER and KRACE (p. 701) concentrated on *A. quadrimaculatus* on all houses and all likely outdoor resting places of *A. quadrimaculatus* over large area, in the hope that this might be more effective than residual spraying of houses combined with the use of field larvicides. The results obtained encouraged this hope though eradication was not achieved.

BRADLEY and FARR (p. 42) as a result of a second season's residual DDT spray programme found that at a concentration of 700 mgm. per square foot

over 98 per cent of houses (in southern U S A) were free of *A. quadrimaculatus* 4 months or more later, and that fewer of the anophelines taken in sprayed houses showed evidence of human blood than of those taken elsewhere. In comment, GORDON refers to British work on *A. gambiae* which indicates that at least 200 mgm per square foot are needed for effective results.

As a result of experience of treating with DDT emulsion the insides of all buildings in an area near the Wheeler Reservoir (Tennessee Valley) HINMAN and CUTKOMP (p 156) conclude that this procedure offers better protection than mosquito-proofing against malaria transmission. *A. quadrimaculatus* is the mosquito concerned. CUTKOMP (p 156) has compared the immediate and residual action of several insecticides, but for details the original should be consulted.

WEATHERSBEE *et al* (p 1063) have observed that at concentrations of DDT of 40 mgm per square foot to animal houses the surface remained free of *A. quadrimaculatus* for 27 days, at 200 mgm the period was 135 days.

LINK (p 43) has made blood surveys in South Carolina, and also in Porto Rico on populations in areas where residual DDT spray was used, and on control populations. The vectors were *A. quadrimaculatus* and *A. albimanus* respectively, and the results indicated a reduction in malaria, but the doses of DDT are not given.

A description of the malaria situation of British Guiana, and of the breeding habits of *A. darlingi*, the chief vector, is given by STAGE and GIGLIOLI (p 308), who show that DDT applied as a residual insecticide is most effective against this mosquito. GIGLIOLI (p 976) states that in the parts of British Guiana in which DDT residual spray has been extensively used, *A. darlingi* has been eradicated. The aim is to treat all buildings with 150 mgm DDT per square foot at intervals of 8 months or even longer.

As a result of their experiments GALVÃO and DAMASCENO (p 683) think that application of DDT (195 mgm per square foot) as a residual insecticide in wooden houses at intervals of 4 months should be effective against *A. darlingi*, where breeding takes place throughout the year.

A DDT spray campaign against *A. darlingi* in Brazil was very effective in reducing the number of mosquitoes in the houses, and the number of cases of malaria (BRAGA *et al*, p 408).

The use of DDT as a residual spray was apparently successful in reducing the incidence of malaria along the coast of Peru (CORRADETTI, p 871).

KUCHER (p 307) writes of a Russian insecticide derived from coal tar.

Larvicidal methods—Experiments in England by JOHNSON and WALTON (p 306) showed that the critical density of application of DDT for the control of anopheline larvae is about 40 gm per acre (10 mgm per square metre), below which results are unreliable, especially if there are reeds. Oil solution is better than emulsion.

JOHNSON and GOODMAN (p 45) show that DDT in oil, with a spreading agent, gives satisfactory results against larvae of *A. quadrimaculatus* at the rate of 75 gm DDT per acre. The amount of oil needed is very much less than when oil without DDT is used.

In an enquiry on the effect of DDT (used as a larvicide) on wild life, TARZWELL *et al* (p 46) show that at 0.1 lb per acre it had considerable effect on insects, at 0.4 lb an effect on fish, but not much on birds, rats, rabbits, etc., or on plankton.

DEONIER *et al* (p 581) have produced some experimental evidence that DDT applied to mud is effective against mosquito larvae which appear after subsequent flooding.

SAUTER *et al* (p 45) have obtained very fine suspensions of DDT by treating with supersonic waves the emulsions of benzene solutions mixed with water.

PUTNAM and HACKETT (p. 152) give an account of the antimalaria work done in Albania from 1929 to 1933, when drainage or filling of swamps, training of streams, alterations of salinity and Paris green were the means used for control. They describe the habits of the common vectors.

DE MEYLOU and THOMP (p. 149) have noted that quinine and mepacrine will inhibit the growth of larvae of *Aedes aegypti* but that this inhibition is reversed if brewer's yeast is added in quantity to the medium.

Malaria of Birds

Sporozoites of *P. gallinaceum* from mosquitoes which have been grown up in saline or Ringer solution are soon harmed if kept at 4°C. and still sooner at 37°C. but TONKIN (p. 243) has shown that in plasma or plasma saline they survive with no apparent change for more than 14 hours.

WHITMAN (p. 1065) has been able to preserve sporozoites of *P. gallinaceum* for 72 hours by suspending them in an extract of washed chicken erythrocytes. This is an important step in experimental work.

LEWERT (p. 582) has grown *P. gallinaceum* in tissue culture and has observed that subinoculation into chicks led to exclusively exoerythrocytic infection.

GRAMICCIA and BLACK (p. 665) cultivated *P. gallinaceum* in tissue culture from birds which had been infected by blood inoculations of trophozoites; not by sporozoites. Typical exoerythrocytic forms were found in macrophage-like cells.

MAXWELL (p. 495) discusses the glucose metabolism of *P. gallinaceum* and the action of antimalarial agents on it. Details should be sought in the original.

The technique of rearing and feeding *Aedes aegypti* used for transmission of *P. gallinaceum* is described in detail by JOHNSON (p. 309).

HAAS and ARDIS (p. 310) have succeeded in transmitting *P. gallinaceum* by *A. quadrimaculatus*; this has not previously been done.

Quinine and pabidine administered to *Aedes aegypti* by allowing them to feed before and after infection on sugar solution containing the drugs were shown by JOHNSON and ARDIS (p. 1065) to exercise marked inhibitory action on the development of sporozoites of *P. gallinaceum*.

WHITMAN (p. 877) has shown that the hydronaphthoquinone M 2279 has some effect on oöcyt formation if ingested by *Aedes aegypti* within 48 hours of an infective feed of blood containing *P. gallinaceum*. It has no effect on sporozoites. CLARKE and TRELLER (p. 696) have experimented with a hydroxynaphthoquinone in *P. gallinaceum* infections. It is very active against the earliest phases of the developing parasite and there is strong evidence that the effect is against the sporozoite itself. Complete prophylaxis could be obtained. It is also active against late exoerythrocytic forms and against blood forms.

TONKIN and HAWKING (p. 243) have studied the technique of testing drugs on *P. gallinaceum*. For sulphadiazine the best results were obtained when the drug was administered over a period of 4 days.

TERILAN (p. 767) describes his method of using *Aedes aegypti* and *P. gallinaceum* in experiments to determine the antimalarial activity of various drugs.

PARAFSKY (p. 47) reports his experiments with *P. gallinaceum* infection of chicks, induced by either sporozoite inoculation or blood inoculation. Details are given in the original abstract. Treatment with quinine did not eliminate all trophozoites, and exoerythrocytic forms were found in birds so treated; moreover it seems that the blood trophozoites increased as a result of increase of the exoerythrocytic forms. Only the blood forms seem to stimulate immunity.

KROPPERS (p. 156) has found some light resistance to quinine in *P. gallinaceum* in chickens treated with small doses.

WILLIAMSON and LOURIE (p 48) give details of their experiments which showed that resistance to paludrine developed in *P. gallinaceum* (as a result, probably, of mutation) in chicks treated with that drug in two schedules, but that resistance to quinine, mepacrine, M 3349 or sulphadiazine could not be provoked

BISHOP and BIRKETT (p 1066) in comparable tests on *P. gallinaceum* in chickens, showed that with relatively small doses of the various drugs there was no development of drug resistance to mepacrine, only slight to pamaquin, but 40-fold increase to paludrine. This resistance to paludrine persisted on subinoculation

PIFKARSKI (p 1067), similarly, failed to produce resistance to mepacrine

Exposure of chicks infected with *P. gallinaceum* to atmospheres containing excess of oxygen did not benefit them (TERZIAN and SAXE, p 496)

TRAGER (p 159) discusses the relation of biotin and a fat-soluble substance having the same properties, and found in plasma, to the course of avian malaria, details should be sought in the original

TALIAFERRO and TALIAFERRO (p 768) show that nitrogen mustard, which is toxic to lymphocytes, has a decided action in damaging the parasitocidal mechanism of acquired immunity when administered to chickens either shortly before or shortly after infection with *P. gallinaceum* or *P. lophurae*

KIKUTH and MUDROW (p 47), in a paper published in 1939, discuss the early stages of *P. cathemerium* development after injection of sporozoites

SIMPSON (p 873) has studied the cycle and course of *P. cathemerium* infections in ducks and canaries

BECKMAN (p 1067) has shown that if sporozoites of *P. cathemerium* are incubated with canary blood and hen blood, the latter exerts a strong inhibitory action on them, preventing infection of birds subsequently injected, whereas the canary blood has no similar action

WALKER *et al* (p 687) describe the technique they adopted during the war for testing drugs against *P. cathemerium*, for details the original should be consulted

WALKER and RICHARDSON (p 688) discuss the synergic effects observed, in *P. cathemerium* infections, between the 8-aminoquinolines (plasmoquine, pentaquine) and certain naphthoquinones. These effects were evident in curative treatment, but much less so in suppressive treatment, which suggests differences in the mechanism of the two processes

GINGRICH (p 980) found a progressive decline in the immunity acquired by canaries after infection with *P. cathemerium* by injections of blood, and cured by drugs. Immunity had disappeared completely in 8 months

REDMOND (p 769) has studied the electric charge of red blood cells in *P. relictum* infections of pigeons

MICKS (p 497) shows that two strains of *P. elongatum* lost the power to produce gametocytes: one had been passed through ducks, the other through canaries

THOMPSON *et al* (p 1066) show that injected radio-active iron has no effect on *P. lophurae* in ducks or *P. cathemerium* in canaries

RIGDON (p 49) thinks that accumulation of CO₂ in the body at the peak of infection may be the cause of the sudden fall in number of parasites after the crisis. In comment, GARNHAM remarks that the experiments quoted (with *P. lophurae*) are not entirely convincing

RIGDON and McCAIN (p 409) discuss some of the factors which influence the degree of parasitaemia in ducks infected with *P. lophurae*, especially the oxygen and CO₂ content of the blood. Details should be sought in the original

RIGDON and ROSTORFER (p 979) consider that the anaemia caused by *P. lophurae* in ducks is due to destruction of mature erythrocytes and their replacement by the less efficient erythroblasts. The latter are not well suited to the needs of the parasites

TOWKIN and HAWKING (p. 409) describe erythrocytic forms of *P. lophurae* grown in tissue culture of turkey liver.

THOMSON *et al.* (p. 49) have found it possible to immunize ducks with *P. lophurae* or *P. cathamerum* killed by formalin, injected intramuscularly in a medium of paraffin oil with killed tubercle bacilli and an emulsifying agent. Repeated injections protect for about 6 months—the vaccine prevents death and reduces parasitaemia.

HAIRA (p. 769) records the plasmodia found in common Egyptian birds.

Malaria of other Animals

The physiological changes in the blood of monkeys infected with *P. knowlesi* are described by OVERMAN and FRIEDMAN (p. 766). In the stage of heavy infection the red cells are reduced in number and carry little oxygen—these anoxia results and is the cause of death.

FREUND *et al.* (p. 766) have succeeded in inducing a considerable degree of immunity in monkeys by injecting a vaccine of *P. knowlesi* with certain adjuvants.

Soluble antigens from *P. knowlesi* and *P. lophurae* have been used for complement-fixation tests—the former was useful in homologous infections only the latter in both (DAVIS p. 767).

HUFF and COULTON (p. 782) record their attempts to find, without success, pre-erythrocytic stages of *P. rimeri* and *P. cynomolgi*.

RODMAN (p. 978) has shown that *P. rodhaini* of the chimpanzee is transmissible to man and *P. malariae* to the chimpanzee. In comment, GARNHAM remarks that the two should be regarded as identical.

VIERCKE and LIEB (p. 979) describe *P. longi* a new species from a rodent to the Belgian Congo.

The developmental cycle of *Hepatoscydes luchi* in the monkey has been worked out and described by GARNHAM (p. 833). Details should be sought in the original.

Charles W. Verelst

MALARIA

DEGLEYMAN H. & VAN THIEL, P. H. L'épidémie du paludisme à Middelbourg dans les années 1940 à 1946 y compris un examen de porteurs de parasites [Malaria Epidemic in Middelbourg 1940 to 1946, including an Examination of Parasite Carriers.] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 9-10, 591-641.

It was in 1900 that malaria was first proved to be present in Zeeland in the Netherlands. There were 200 primary infections in that year. Thereafter the disease disappeared from the province till 1920-1924 when fresh outbreaks occurred. In 1939 sporadic cases still occurred, the precursors of an epidemic which commenced in 1940 with 40 cases. Maximum prevalence was in 1943 with 900 primary cases. The epidemic ceased in 1945 when only 14 cases occurred.

The malaria outbreaks in Middelbourg differed in certain respects from those occurring in other parts of the Netherlands. The maximum prevalence was in August sometimes in July but never in May-June—most cases were single cases, even when these occurred in households with many children—the disease was not specially prevalent among children.

The spleen index among school children was remarkably low—2.7 per cent. During this examination only one case was discovered that had not previously been notified by local doctors. In September 1941 cellars in the middle of

Middelbourg, that had been exposed by the bombardment of the town in May 1940, were found to be prolific breeding places of *A. maculipennis atroparvus*. It is remarkable that this biotype should have selected such freshwater breeding places, some of them shaded from sunlight, when saline breeding places were readily accessible in the neighbourhood. The extension of malaria had already begun when this unusual source of supply of the anopheline vector first became operative.

Control measures included (1) administration of quinine (1 gm. for adults) on each of two successive days each week, from mid-August to the end of October, to all persons who had suffered from malaria during that or the preceding year, with special attention to the known 65 parasite carriers. (2) spraying the bedrooms of these persons every 15 days with shelltox, during the same period of time, (3) the abolition of mosquito breeding places in the cellars of the town.

One of the reasons why Middelbourg alone, and no other part of Zeeland, suffered from the epidemic was the arrival of infected persons. The barracks were occupied by German troops, many horses were stabled in the middle of the town and attracted large numbers of anophelines.

The final extinction of malaria was probably accelerated by the inundation in October 1944. In the summer of 1945 practically the whole island was under sea-water. No mosquito breeding places were left. There was not a single fresh infection of malaria in Middelbourg in either 1946 or 1947.

Norman White

JAUVOU, C. & TOUMANOFF, C. Compte rendu d'un sondage malarologique effectué en Corse (16-30 Août 1947) [Cursory Malarial Survey in Corsica] *Bull. Inst. Nat. Hyg.* Paris 1948, July-Sept., v. 3, No. 3, 468-81.

A visit of two weeks duration was paid by the authors to Corsica to enable them to obtain preliminary information as to the extent to which war-time events, including the temporary cessation of antimalarial work, had influenced the malaria endemicity of the Island. The inspection was made in the latter half of August, 1947. Visits were paid to a few localities in both the eastern and western sides of the Island.

Spleen and parasite rates of the few places visited were on the east coast 12.8 and 48.6 per cent, and on the west coast 9.6 and 32.2 per cent. There was evidence of locally acquired malaria in Ajaccio, a town which was formerly considered to be almost free from malaria. Gamete carriers were relatively numerous. *A. maculipennis labranchiae* and *A. sacharovi* were found on both sides of the Island. One infected *A. m. labranchiae* was captured. A further more detailed survey was to be carried out in the late autumn.

Norman White

BLONOMINI, G., SICCA, G. T. & MANFREDI, M. La malaria all'isola d'Elba [Malaria in the Island of Elba] *Riv. Italiana d'Igiene* 1948, Jan-Feb., v. 8, Nos. 1/2, 1-12, 1 map & 1 chart.

Between the world wars, malaria was a disease of little account in the Isle of Elba. After the first war, a considerable outbreak occurred in connexion with constructional work on a cement factory, this rapidly subsided. In 1943, there was a noteworthy increase in malaria prevalence and the incidence increased in the following years. The Commune of Portoferraio in the north of the Island was chiefly affected. This exacerbation of the disease was attributed in part to the return of soldiers from infected war zones, the arrival of troops from Corsica and Sardinia, and passage of Moroccan troops through the Island. The authors

were invited to study the situation and carried out an investigation that lasted from September 1946 to October 1947. Their findings are summarized in this report.

The only anopheline found was *A. macbryani labanchiae*. This marks the northern-most limit in Italy of the distribution area of this sub-species. Its area of distribution in the Island are circumscribed, breeding places are not numerous, and prevalence is not excessive.

Malaria cases occurring in 1946 and 1947 are given in graphic form. All were *P. fies* infections. Cases occurring in February and March were presumably infections contracted in the previous autumn. There is a steep rise in the curve which reached its height in July or August. Spleen rates of children were indicative of low endemicity.

A DDT campaign was started in June 1947. All houses, stables and out buildings, in the infected areas were sprayed. This appears to have cut short the epidemic but *labanchiae* was still found breeding in limited numbers. Antilarval measures were then superimposed. The measures were to be continued the following year and it was hoped that they would be successful in eradicating *Anopheles* and malaria from the Island. Norman White

For H. KONDI Athens, DANKAS C. DEPOULAY Margaret, LERGOPOULOS Theresa, BACI L. G., DAX, R., PITCHFORD J. SHIPLE Pamela & LANGTON Moira. Malaria and Blackwater Fever in Macedonia and Thrace in relation to DDT. *Ann. Trop. Med. & Parasit.* 1948, Sept., v. 42, No. 2, 153-72, 5 figs. & 1 map [71 refs.]

This is a record of a malaria survey carried out in Macedonia and Thrace during November and December 1946 to assess the relative cumulative effect of the nation-wide DDT campaign of the preceding year and of natural variation in malaria endemicity respectively, on the low malaria-rates in northern Greece since the severe malaria epidemic of 1941. The incidence of malaria in Macedonia has long been characterized by annual variations in intensity, probably connected with variations in anopheline density which is dependent on the rainfall in late winter and spring.

During the twenty four years 1923-48 there was a noteworthy overall decline in malaria morbidity in Macedonia, punctuated by occasional years of abnormal prevalence. As a measure of malaria incidence the authors use the percentage of malaria in total admissions to the Central Refugee Hospital and the Municipal Hospital in Salonika, the former of which is mainly occupied with rural populations. The mean malaria incidence for the twelve-year period 1923-34 was 17.5 per cent. for 1935-48 it was 10.6 per cent. In 1941 there was a major malaria epidemic that affected the whole of Greece. The incidence in Macedonia rose from 13.7 per cent. in 1940 to 28.4 per cent. in 1941. This epidemic occurred during the German occupation when there was much disorganization and acute food shortage. There was a rapid decline in malaria incidence in the following years: in 1945 it was only 3.5 per cent. The extensive use of atabrin (mepacrine) may have contributed to this decline. The DDT campaign was undertaken late in 1945.

A country-wide survey of Macedonia and Thrace was carried out during November and December 1946. 1,000 spleens were palpated and the blood of 7,000 school children and of 200 infants who had lived through only one transmission season was examined. The parasite-spleen ratio which in the past had usually ranged from 1:2 to 1:4 had fallen to 1:31 to 1:70. Evidence was obtained that DDT had contributed much to the remarkable reduction of malaria incidence in Macedonia and Thrace. The incidence in 1946 was only 1.7 per cent.

The greatly increased incidence of malaria in 1942 was not accompanied by a corresponding increase in the incidence of blackwater fever *Norman White*

MONTALVAN C, J A Paludismo en Guayaquil [Malaria in Guayaquil] *Rev Ecuatoriana de Hig y Med Trop* Guayaquil 1944, Apr, v 1, No 2, 131-60, 2 maps, 5 graphs & 1 fig

HUFF, C G Exoerythrocytic Stages of Malarial Parasites *Amer J Trop Med* 1948, July, v 28, No 4, 527-31 [19 refs]

This is an account of the various questions relating to the exoerythrocytic stages of malaria parasites. It was written before the demonstration of the hitherto hypothetical exoerythrocytic stages in mammalian malaria.

The points dealt with, which need not now be elaborated further, are —

"What are exoerythrocytic stages?"

"Why were they so long in being discovered?"

"What types of exoerythrocytic stages are known?"

"In what species have exoerythrocytic stages been demonstrated?"

"What about the claims for finding exoerythrocytic stages in human and simian malaria?"

"Do such stages really exist in human or simian malarial infections?"

"Do exoerythrocytic stages offer the means for any new approaches to old problems in malaria?"

"What is the significance of the exoerythrocytic stages in the life-cycle?"

H E Shortt

BIJLMER, J & KRAAN, H Is the Gametocyte Production of *Plasmodium vivax* Influenced by Elimination of the Mosquito Passage? *J Trop Med & Hyg* 1948, Nov, v 51, No 11, 222-5

If *Plasmodium vivax* infection is transmitted serially by blood inoculation, the sexual cycle is eliminated and it is conceivable that the formation of gametocytes may decline or even cease. Some observations appearing to substantiate this effect have, in fact, been disproved when subjected to critical tests.

The authors investigated the problem at the Wilhelmina Hospital in Amsterdam and arrived at the following conclusions —

(a) The ability to produce many or few gametocytes is a strain characteristic in a given plasmodial species.

(b) In malaria, exclusively transmitted by blood inoculation, there occurs a diminished power of the parasite to produce gametocytes. The decline, in extent and rapidity of onset, varies with the strain in use. *H E Shortt*

GAUD, J Fréquence au Maroc et rôle vecteur possible d'*Anopheles sergenti*, Theo [Frequency and Possible Vector Role of *Anopheles sergenti* in Morocco] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 498-501, 1 map & 1 fig

During an anopheline survey of Morocco in 1947, the following species were found as larvae and adults: *A. maculipennis* [the subspecies is not stated, but it is presumably *labranchiae*], *A. sergenti*, which was surprisingly abundant, *A. turkhudi* (? *A. hispaniola*), *A. multicolor* and *A. claviger*, all these were house frequenters in different degrees. Other species taken were *A. marleri* (a new record for Morocco) and *A. constantii* from some new localities.

The distribution of *A. argenti* is indicated on a sketch map north, but it occurs near the coast as well as inland. The highest altitude at which it was captured was 1700 metres (approx. 5500 feet). It was prevalent between June and November and most abundant in September and October. Its relation ship to malaria transmission is uncertain. 33 dissections were negative proving nothing, but this species enters houses readily and after *A. maculipennis* is the most domestic anopheline.

The wings of the Moroccan form of *A. argenti* differ from the typical form in that the basal and peripical dark areas of the costa are so extended that in some specimens the two adjacent pale spots are obliterated, leaving only two pale costal spots.

H. S. LORRY

CAURET P. ABONKENC, E., REAU BONNETY I. & LOUIS-SIVREY Les moustiques du genre *Anopheles* à la Martinique [*Anopheline Mosquitoes in Martinique*]. Arch Inst Pasteur de la Martinique 1918, Jan. & 1 No. 1 9-11

Between November 1916 and November 1917 the authors collected 3,300 larvae and pupae of *Anopheles aquasalis* and 23 larvae and pupae of *A. argyritarsis* in Martinique. They give the names of the localities and the types of breeding places from which they obtained them and note that *A. albanus* was not seen.

H. S. LORRY

BURGESS R. W. The Experimental Hybridization of *Anopheles quadrimaculatus* Say and *Anopheles maculipennis freeborni* Allen. Amer J Hyg 1919, Sept., v 43, No. 2, 171-2

"Hybridization between *Anopheles quadrimaculatus* Say and *Anopheles maculipennis freeborni* Allen under laboratory conditions is reported.

A. quadrimaculatus males mated with *A. maculipennis freeborni* females produced 30.3 per cent. fertile ova. The fertility of the opposite cross was only 2.0 per cent.

All larvae were small and weak and none survived beyond the third instar."

PRATT H. D. Influence of the Moon on Light Trap Collections of *Anopheles albimanus* in Puerto Rico. J National Malaria Soc 1918 Sept. 7 No. 3 21-20 6 figs.

Four years trapping records and observations on *Anopheles albimanus* are discussed in this paper. Charts are presented to illustrate the effect of moonlight on the catches in light traps.

Experiments with light traps of different light intensity showed that they attracted *A. albimanus* in numbers which varied according to the intensity of the light given out by the traps. When a single trap was used, the size of the collection varied with the "dark" and "bright" phases of the moon; the darker the night the greater the numbers of mosquitoes attracted. When an animal trap was situated near a light trap the light collections were then higher than those in the bait trap during the "dark" phase of the lunar cycle and approximately equal to, or lower than, those in the animal trap during the "bright" phase. The size of the collections from both types of traps fluctuated seasonally, but those from the light traps were also subject to cyclic fluctuation within each month. The suggestion is made that the mosquitoes do not use the light trap so well during the "bright" phase of the moon as during the "dark" phase. Animal traps may therefore give a truer conception of the trends in anopheline populations.

It is more difficult to determine an index for "satisfactory control" based on light trap collections alone, but it may be stated that, in general, little or no malaria transmission occurred when light catches averaged 1-5 *A. albimanus* per night during the "bright phases" and 5-20 during the "dark phases" of the moon. These figures are comparable with the single figure of 2 to 5 *A. albimanus* per animal trap per night given as the "satisfactory control" figure for military bases.

H S Leeson

DEANE, L M, CAUSEY, O R & DEANE, M P. Notas sobre a distribuição e a biologia dos Anofelinos das regiões Nordeste e Amazônica do Brasil [Notes on the Distribution and Biology of the Anophelinae of the North-East and Amazon Regions of Brazil] *Rev. Serviço Especial de Saúde Pública* Rio de Janeiro 1948, May, v 1, No 4, 827-965, 6 graphs & 39 maps on 6 pls [34 refs.] English summary

The observations recorded in this paper were made by the authors from 1939 to 1944. Many thousands of anopheline mosquitoes, larvae and eggs were examined and thirty-six species were found. A number of identifications were confirmed by laboratory-bred specimens. The distribution of each species is given in tables and shown on maps. Other tables show the results of salivary gland and stomach dissections for malaria infections, the results of hourly collections and collections in animal shelters and human dwellings are also given. The results of hourly captures of *Anopheles darlingi*, *A. albimanus* and *A. aquasalis*, both indoors and outside, are shown on six graphs.

A. darlingi and *A. aquasalis* are the only species of real importance in the transmission of malaria in these regions, the African invader *A. gambiae* has been eradicated.

A. darlingi is the most domestic species and previous observations that this anopheline normally enters houses during the late hours of the night were confirmed, though two peaks of entry, one at sunset and one just before sunrise, were often noted. Where the species was abundant, it was captured feeding outside as well as indoors at any time, even during the hottest part of the day, but where it was rare it could only be found indoors during the late hours of the night or at dawn. Comparative captures yielded larger numbers on horse than on man, indicating that this species is perhaps less anthropophilic than it was thought to be. Among 1,600 dissections of females of *A. darlingi*, 28 (1.8 per cent) were found to be infected, though for different localities the rates varied from 0 to 50 per cent. Where the species was abundant the infection rate was low and the opposite was also true.

Whereas *A. darlingi* is a freshwater breeder, *A. aquasalis* larvae were usually found in brackish water, both along the coast and as far inland as 140 kilometres from the sea. *A. aquasalis* invades houses and feeds readily on man in the north-east of the country but in the coastal areas of the Amazon region it is far less domestic. It is a malaria vector, either alone or together with *A. darlingi*, but in the areas investigated it is not so important as *A. darlingi*, because it is less domestic in habit, and because it is dangerous only when abundant.

Two forms of *A. albimanus* were encountered. One of them (var. *domesticus*) was found feeding frequently on man during a malaria epidemic in an area where it was the only abundant anopheline, in other places *A. darlingi* and *A. aquasalis* were also present. The other form [not named] feeds on animals and does not seem to take any part in the transmission of malaria.

One other anopheline, *A. pessoai*, (perhaps synonymous with *A. brasiliensis*) was once found infected with sporozoites. There is no evidence that any of the other species is a natural vector of malaria in these regions.

H S Leeson

PITTEMBRIGH C. S. The Bromeliad-Anopheles-Malaria Complex in Trinidad.
1. The Bromeliad Flora. Reprinted from *Evolution* 1948 Mar v 2
No. 1 58-69 7 figs. (4 on pls.) [27 refs.]

The Anopheline mosquitoes of the subgenus *Anopheles* breed in water held among the leaf bases of Bromeliad plants, growing as epiphytes on trees in Tropical America. The present paper is a contribution to the natural history of these plants, of which fifteen genera and a large number of species are found in Trinidad. The author has produced an interesting classification of the types of environment which they inhabit. Some grow on rock and root in soil; others have developed "nutritive independence" - they grow on limbs of trees, hold water and humus among their leaf bases and exploit these materials. The distribution of species is determined rather by light than by atmospheric moisture.

P. J. Rattray

MARTINEZ MUJICA, Celia. Reticulo endotheliosis palúdica. [The Reticulo-endothelial System in Malaria.] *Medicina* Mexico, 1948 Oct 10 & 25 Nov 10 & 25 v 28 Nos. 563 566 567 & 568 417 '78 451 '7 459 '79 481-8 10 figs. [Numerous refs.]

This article deals fairly exhaustively with the reticulo-endothelial system, not only as regards malaria, but more generally. The whole consists of ten sections - but much of it is recapitulatory and brings together our knowledge of the subject and sums up the latest views on it without contributing much that is really new. In fact, a good deal has already been incorporated in the textbooks.

Section I sketches briefly the history of our knowledge of the r.e.s. from the time of Rattier's observations in 1890. Section II describes the normal histology of the system in the blood-vessels, the spleen, lymphatic glands, bone-marrow, the connective tissues, lungs, liver, brain, etc. Next follows an account of the physiology of the system as regards malaria, phagocytosis, haematolysis, destruction of red and white corpuscles and platelets, and haemopoiesis, the development of immunity or rather the prevention of its development when the r.e.s. is blocked. In Section III the pathology of the r.e.s. is considered in connexion with infective diseases in general - (a) taking up organisms by the cells of the system. This is followed by a description of the part it plays in paludism, with photomicrographs showing cells of the capillaries blocked by parasites, and of the spleen and liver in malaria and of the xer erythrocytic forms of *P. cathemerium* and *P. circumflexum* in the canals. There is presented a very clear schematic presentation of the parasite cycle - the xer erythrocytic cycle, the cryptozoites of Huff, the schizontic cycle of Golzi and the sporogonic cycle of Ross (so named by the author). Section VI treats of the r.e.s. and the clinical manifestations of malaria and states that the anaemia associated with the disease is not due solely to destruction of red corpuscles, but also to blocking and injury to the haemopoietic organs. Section VII discusses the rôle of the r.e.s. in malaria immunity - especially in the spleen, liver and bone-marrow - by causing concentration of histocytes and hyperplasia of them and in stimulating phagocytosis by them. Next follows remark on the laboratory diagnosis in regard to the r.e.s., indicating that the ordinary method is inadequate to demonstrate malarial reticulo-endotheliosis, and once taking the reactions of Henry and Soherus. The epidemiology of malaria and its relations with the r.e.s. are evidenced (Section IX) by the plenic and parasitic indices. Finally the subject of treatment is considered and it is shown that parasites not destroyed in the blood find refuge in the cells of the r.e.s., where they continue to develop and remain until conditions become

favourable, when they are discharged into the blood-stream, attack fresh corpuscles and set up a relapse. At present, says the author, we lack drugs which will attack the reticulo-endothelial phase of the parasite, but experiments are being undertaken to produce synthetically some product which will effect this. In conclusion, it is recommended that "malarial reticulo-endotheliosis should be investigated by all possible means, including the reactions of Henry and Soberón, in persons exhibiting mental disturbance of sudden onset who suffer or have suffered, from malaria, or who reside in, or have come from, malarious districts, if no other, obvious, cause for the disturbance can be found."

H Harold Scott

LIPPI, M. L'attività secretoria dello stomaco nella malaria cronica [Secretory Activity of the Stomach in Chronic Malaria] *Acta Med Italica* 1948, Sept v 3 No 9, 231-4 English summary (10 lines)

This paper concerns twenty patients suffering from chronic malaria, all of whom had enlargement of the spleen and liver, well marked hypochromic anaemia and leucopenia. In each case a tube was introduced into the stomach in the early morning after the night's fast and left *in situ* till four samples of the gastric secretion had been obtained, at intervals of half an hour. In all samples there was a noteworthy decrease of total acidity and of hydrochloric acid content. Thus the author attributes to the changes in the blood, bone-marrow, liver and spleen that characterize chronic malaria. He thinks, too, that splenic hyperfunction may inhibit thyroid stimulation of the gastric secretion.

Norman H Hult

MONTALVAN, C. J. A. Algunas consideraciones sobre el diagnostico clinico del paludismo en comparación al resultado del examen de sangre [The Clinical Diagnosis of Malaria compared with Examination of Blood Films] *Rev Ecuatoriana de Hig y Med Trop* Guayaquil 1944 Apr, v 1 No 2, 161-6 2 figs

ZAKI, A. The Value of Tyrosine Index in Malaria and other Endemic Diseases in Egypt. *J Roy Egyptian Med Ass* 1944, Aug v 27, No 8, 243-50 [Reed 13 Dec, 1948]

- ' 1 The tyrosine serum index in pure cases of malaria is not always increased
- ' 2 Other parasitic diseases increase the tyrosine index especially *S. mansoni* infection. The index was also definitely increased in cases of hypertension and pellagra
- ' 3 It is very difficult to find pure cases of malaria in Egypt as the great majority of the rural population are very often infected with parasitic diseases and therefore tyrosine cannot be relied upon in the diagnosis of malaria.

CIUCA, M., BALLIF, L., CHELARESCO, M., CONSTANTINESCO, C. & TIMIŞESCU, A. Recherches comparées sur l'infection expérimentale, en but de malarithérapie, des malades appartenant respectivement à une région non paludéenne (Bucovine) et à une région endémique (Moldavie) [Comparative Study of Infection as a Result of Malaria Therapy of Patients from a Non-Malarial (Bukovina) and a Malarial (Moldavia) Region] *Arch Roumaines Path Expér et Microbiol* 1945-1946-1947, v 14, Nos 1/4, 193-206, 10 charts

This short paper makes some interesting comparisons between the relative susceptibility to the same strains of malaria of two populations in Roumania, one from an endemic area, Socola in Moldavia and the other from a non-endemic area, Bukovina. The patients reported on in these series were undergoing

treatment by therapeutic malaria and the data are strictly comparable as the malarial strains used were identical, *P. vivax* T. B. Hoar and *P. malariae* (P).

The results of the comparison showed that the patients from the non-endemic area had a markedly lower resistance to infection by these strains as evidenced by the following findings:—

- (a) They gave a hundred per cent. infection rate as compared with 83.1 per cent. in the case of those coming from the endemic area.
- (b) The incubation period was shorter
- (c) The degree of parasitaemia was greater
- (d) Anti-malarial drugs took longer to cause disappearance of the parasitaemia, at least in the case of infection with *P. malariae*

H. E. Sherr

CIUCA, M. BALLIU, L. CHELARESCO, M. VRABIE, M. & MONTEANT VASILIU, F. Particularités régionales de l'infection paludéenne utilisées en but de traitement (malaria-thérapie) [Regional Factors affecting the Malarial Infection acquired as a Result of Malaria Therapy]. *Arch. Roumaines Path. Exptl. et Microbiol.* 1945-1946-1947, 14 Nov. 14, 207, 172 graphs.

This is practically a repetition of the previous paper the results being those obtained in another non-endemic area of Rumania where only scanty sporadic cases of malaria occur (Sibiu, Transylvania).

The findings confirm previous experience that patients from non-endemic areas have less immunity to malaria than those from endemic areas.

H. E. Sherr

JOYCE, M. D., EYLES, D. E. & BLACKSBY, R. W. Studies on Imported Malaria. 10. An Evaluation of the Foreign Malaria Introduced into the United States by Returning Troops. *J. National Malaria Soc.* 1948 Sept. 7 No. 3, 171-85. [38 refs.]

Nine reports on studies in the United States of returned military personnel with malaria acquired overseas have previously been published, and summarized in this *Bulletin* [1946, 43, 3, 1002; 1947, 44, 773, 489; 1948, 45, 204, 298, 859, 1052, 1053]. This tenth report summarizes the findings of the entire programme of studies. The observations were carried out in ten Army and Navy hospitals and foreign strains of malaria were used in the treatment of neurosyphilis in eight other institutions. About 1,000 members of the Forces with relapsing malaria were examined, another 1,000 patients or volunteers were infected with one or other of the malarial strains isolated. There was no infection with *P. malariae* and only 8 cases of *P. falciparum* infection. One of the latter from Guadalcanal infected 4 m. *frankform* and another from Africa infected 4 *quadrinucleatus*. Most of the studies concerned *P. vivax*.

No consistent morphological differences could be detected between imported and indigenous strains of *P. vivax*. In two different *P. vivax* infections from New Guinea, forms resembling *P. ovale* were found on a few occasions but their occurrence was transient: they were probably abnormal forms of *P. vivax*.

There was but little heterologous immunity between *P. vivax* infections from the South Pacific, China-Burma India theatres and from the United States. One infection from New Guinea showed little immunity to another strain from the same area. Prepatent and incubation periods were shorter in infections with Mediterranean than with Pacific strains.

American Negroes are resistant to *P. vivax* of both Pacific and Mediterranean origin. In one study 31 per cent. of Negroes bitten by infected mosquitoes became infected as compared to 85 per cent. white patients.

When the fever first reached 100°F the number of parasites of Pacific strains averaged only 21 per cmm, the average number of parasites of Mediterranean strains was 45. Peak parasitaemias, averaging about 14,000 per cmm, were usually attained in the second week and were generally higher in Pacific than in Mediterranean infections. Maximum temperatures (average 105°F) tended to occur several days earlier than maximum parasitaemias. In tertian fevers the periodicity, average time between fever peaks, was 44.4 hours for four Pacific strains and 45.1 hours for one Mediterranean strain; none had a 48-hour periodicity.

Two hundred patients with delayed primary attacks were studied, mostly from New Guinea. The delayed primary attack occurred 49.1 days (average) after cessation of suppressive mepacrine. The parasite-fever thresholds in 65 patients were 730 parasites per cmm in delayed primary attacks and 1,980 in subsequent relapses, both much higher than in induced attacks with similar strains.

The foreign malarias responded well to treatment, of the commonly-used drugs, chloroquine was the most effective, quinacrine next, and then quinine, the poorest.

A smaller proportion of Mediterranean malarias relapse than of those from the Pacific. With a Pacific strain (Chesson) it was found that the greater the sporozoite inoculum, the shorter the prepatent period, the greater the relapse rate and the shorter the interval between relapses.

The comparative susceptibility to foreign *P. vivax* malarias of five anophelines, (the infective index of the most susceptible being expressed as 100) was found to be *A. m. freeborni* 100, *A. punctipennis* 86, *A. quadrimaculatus* 84, *A. p. pseudopunctipennis* 41, *A. albimanus* 2. Some foreign strains have been maintained unpaired through many man-mosquito transfers; they have very readily adapted themselves to new mosquito hosts.

Compared with indigenous strains, foreign malarias relapse more promptly after treatment of primary attack and produce a greater number of relapses. Parasitic relapses are not always accompanied by symptoms; the total time of asymptomatic parasitaemia is considerably greater than the time of symptomatic parasitaemia. In general the number of gametocytes was found to be a fairly constant proportion of total parasites present. The patient with asymptomatic parasitaemia is the one most likely to spread the disease in the conditions prevailing in the United States.

In 1945 there may have been in the United States as many cases of foreign *P. vivax* malaria as there were cases of indigenous strains (estimated at about 20,000).

Norman White

HOEHNE K. Über Rezidivneigung und Konstitution bei Malaria. Ein Beitrag zur Frage der Abhängigkeit des Infektionsverlaufes vom Konstitutionstyp [Constitution and the Tendency to Relapse in Malaria. A Contribution on the connexion between the Course of Infection and the Bodily Formation]. *Deut. med. Woch.* 1948 Nov 5, v 73 Nos 41/42, 530-31, 1 fig. [10 refs.]

SANDERS, J. P. & SANDERS, J. C. Intravenous Quinine in Post-War Malaria. *Med. Times* New York, 1948, Nov., v 76, No 11, 465-9.

A study of 271 cases of chronic malaria, 259 being civilians and 12 ex-servicemen. No attempt was made to identify the type of parasite although it is considered that the majority were of the benign tertian or tertian [*sic*] variety. Diagnosis was made largely from the history, symptoms, and physical signs; parasites [variety not stated] being found in only 72 patients in spite of routine examination of thick and thin films repeated many times in some

instances. Most of the patients had a leucopenia and high count of small lymphocytes while the spleen was almost always enlarged and tender.

Intravenous injections of 5 to 15 grains of quinine dihydrochloride in 100 cc. of 5 to 10 per cent. glucose were given the usual dose of quinine being 10 grains. Injections were usually repeated after 2 or 3 days, although occasionally they were given daily the number and frequency being determined by the patient's reaction and condition.

Among the 289 civilian cases a history of previous attacks was given in 64 per cent. Headache was the most prominent complaint although as might be expected, symptoms of almost every known disease were complained of, and many cases of resistant cough for which the patients had been treated for tuberculosis cleared up under treatment.

One patient had 12 injections and 3 patients had more than this number. The highest age group was over 50 (71 patients) while 22 were under 20. "Coloured people" numbered 34. Of the 1 ex-servicemen most had taken atabrin [mepacrine] while abroad and received other medication at some time.

The authors claim for this method of treatment —

(1) Complete relief of all symptoms in practically every case.

(2) Toleration in all age groups especially the aged.

(3) A general tonic effect possibly due to the glucose.

(4) Decrease in toxic effects while many of the side effects of quinine by mouth are avoided.

(5) Safety in allergic subjects although a few patients had to discontinue treatment on this account. Any reactions noted were not usually serious. Only 22 per cent of relapses were reported within two years.

[As the authors point out it was impossible to exclude reinfection in Louisiana and it must be remembered that 178 cases had other treatment by mouth, e.g. quinine quindine totaquina mepacrine atabrin. It is rather difficult to assess the value of this method for 1.] C. F. S. 424

MARSHALL, P. B. & ROGERS, E. W. The Determination of Quinine Degradation Product in Blood, and its Absorption in the Chick. *Biochem. J.* 1943 v. 43 No. 3 414-16 1 fig.

(1) A method for the quantitative determination of quinine degradation product (QDP) sensitive to 5 μ g. is described.

(2) The red-cell concentration of QDP in chicks during 7 hr. following oral doses is approximately the same as that of an equal dose of quinine indicating that the previously observed higher antimalarial activity of quinine is due to higher specific activity on the parasite and not to superior absorption in the host.

CITCA, M., SOFLETE, A., CONSTANTINESCU, P. & TERITEANU, N. Preliminary Note on the Therapy of Malaria with Paludrine in Experimental Infection by Inoculation of Infected Blood. *Bull. World Health Org.* 1944 v. 1 No. 2, 301-7.

A Rumanian strain of *P. vivax* that had gone through 279 passages was used. Forty patients were inoculated. Of these 8 received one dose of 100 mgm. paludrine 7 between the 4th and 8th days of fever and one after he had had paroxysms for a fortnight. In 7 cases fever disappeared within 24 hours of the administration of paludrine. In the other temperature was normal 3 days after the drug was given. In 2 cases parasites were absent from thick drops on the third day, in 4 on the 4th and in 1 on the 5th day. Twenty-four

patients were treated with 200 mgm of paludrine for 7 days, the fever ceased after an average period of 1.65 days and parasites disappeared after an average of 3.65 days. Similar results were obtained in eight patients treated with 300 mgm paludrine a day for 7 days. A single dose of 100 mgm is amply sufficient to avert the attack.

Nine patients were inoculated with an African strain of *P. malariae* in its 137th passage. They each received 200 mgm paludrine a day for 7 days, the treatment starting from the 4th to the 10th day of fever in 4 cases, from the 10th to the 15th in 4 cases, and on the 24th day of fever in one case. On an average, the fever disappeared in 1.88 days and the parasites after 8.8 days (3 to 14). In only 3 patients did the parasites disappear during the course of the 7 days' treatment. Results similar to these were obtained in 4 patients treated with 600 mgm paludrine a day for 7 days, and in 12 others treated with 600 mgm a day for ten days. *P. malariae* shows a degree of resistance to paludrine comparable to that previously observed to other schizonticidal drugs.

Norman White

CHAUDHURI, R. N. & CHAKRAVARTI, H. Intravenous "Paludrine" (Proguanil)
Brit Med J 1949, Jan 15, 91-3, 1 fig

Eleven patients suffering from malaria in Calcutta were treated with intravenous injections of paludrine acetate (soluble proguanil). Eight had *P. falciparum*, 2 *P. vivax* and one mixed infections. Most of the patients had serious cerebral or gastro-intestinal complications that rendered their cases unsuitable for medication by mouth. Details are given of each case. At first the dose was 100 to 200 mgm repeated two or three times at intervals of four hours. Later it was a single dose of 300 or 400 mgm. The total amount of paludrine per case injected ranged from 200 to 600 mgm. With the higher doses the blood became clear of parasites in from 24 to 48 hours and the temperature fell to normal in from 32 to 72 hours. One patient in a moribund state died. Another with typical cerebral malaria remained unconscious for several days, developed signs and symptoms of encephalitis but ultimately recovered. The injections were well tolerated. One patient however, had transient phlebitis of the injected vein.

Norman White

COVELL, G., NICOL, W. D., SHUTE, P. G. & MARYON, M. "Paludrine" (Proguanil) in Prophylaxis and Treatment of Malarial Infections caused by a West African Strain of *P. falciparum*. *Brit Med J* 1949, Jan 15, 88-91.

The authors refer to the very divergent accounts of the efficacy of paludrine in the treatment and prophylaxis of malaria that have emanated from different parts of Africa and elsewhere. To clear up some of the points at issue they undertook a series of prophylactic and therapeutic trials at Horton Hospital, Epsom, using a strain of *P. falciparum* from Lagos, Nigeria. Laboratory-bred *A. stephensi* were used for transmission. Twenty-seven patients were used in the prophylactic tests, they were each infected once a week over a period of six weeks. Drug administration was started three days before the first infection and continued until the sixth day after the last infection. The dosages of paludrine used were 100 mgm daily, 50 mgm daily, 100 mgm twice weekly, 300 mgm once weekly—five patients in each group, together with 7 controls (2 on quinine and 5 on no drug). Paludrine was found to act as a true causal prophylactic against this strain of *P. falciparum*. The prophylactic dose recommended for non-immune adults exposed to malaria infection in West Africa is 100 mgm daily.

Twenty-five other patients were used in the therapeutic tests, the schedules and results are shown in tables, paludrine controlled the clinical attacks in

these patients but its action both as regard the persistence of liver and of parasites in the peripheral blood, was somewhat slower than that of mepacrine or quinine. Paludrine unaided failed to effect radical cure of infection with this strain: this was in marked contrast with the results of FAIRLEY *et al* with New Guinea strains [this *Bulletin* 1947 v 44 282]. Radical cure was apparently obtained with 300 mgm. paludrine twice daily for 10 days plus 800 mgm. of mepacrine given in 3 doses on the first day of treatment (6 cases) (shown in the table as 5) with 300 mgm. paludrine twice daily for 10 days plus 30 grams (2 gm.) quinine hydrochloride given in 3 doses on the first day of treatment (5 cases) and with 10 grains (650 mgm.) of quinine hydrochloride twice daily for 10 days (5 cases).

After a course of 300 mgm. paludrine twice daily for 10 days gametocytes were non-infective to mosquitoes.

A course of paludrine 300 mgm. twice daily for 10 days together with 800 mgm. mepacrine in 3 doses on the first day shortened the duration of clinical symptoms by about 24 hours. Such a course followed by a maintenance course of 100 mgm. paludrine a day for the following six weeks should secure rapid termination of the clinical attack, a high radical cure rate and sterilization of gametocytes with a minimum risk of toxic effects. Norman Macle

BURN, J. H. & VANE, J. R. The Inhibitory Action of Paludrine on the Secretion of Gastric Juice. *Brit. J. Pharmacol. & Chemotherapy* 1948 Dec. v 3, No. 4 348-9 2 figs. [12 refs.]

The increased secretion of gastric juice which occurs in patients with peptic ulcer can also be produced by histamine. During or between periods of intravenous infusion of the latter substance to anaesthetized cat the inhibitory effect of paludrine and related substances on the secretory flow was determined and provided a severe test of such action. The drugs for test were administered in a single intravenous dose or by infusion. Sometimes there was a transitory rise in secretion immediately after administration. Paludrine reduced secretion both as regards volume and amount of free and pepsin. The only other substance with comparable activity was that in which a methyl group replaced the isopropyl group of paludrine. Gastro-intestinal symptoms in man and anorexia in dogs which may arise from administration of paludrine are probably related to the present findings. J. D. Fulton

VANE, J. R., WALKER, J. M. & PARRY, C. B. W. The Effect of Paludrine on Gastric Secretion in Man. *Brit. J. Pharmacol. & Chemotherapy* 1948 Dec. v 3 No. 4 350-51

"1. The effect of paludrine on gastric acidity has been investigated by carrying out test meals on 8 subjects.

"2. A significant reduction in acidity occurred when 0.9-1.0 g. paludrine was given by mouth 2 hours before the test meal.

DOLL, R. & SCHNURDER, R. The Effect of Paludrine on Human Gastric Secretion. *Brit. J. Pharmacol. & Chemotherapy* 1948, Dec. v 3 No. 4 352-3

1.0 g. paludrine hydrochloride given 2 hours before the start of a gruel test meal produced a significant depression of more than 33 per cent in the concentration of free acid during the first 1½ hours of the meal. A consistent effect was observed with doses of up to 400 mg. paludrine acetat given intravenously on the gastric secretion in response to histamine.

- 1 BRITISH MED J 1949, Jan 15, 106-7 Second Thoughts on Proguanil [16 refs]
- 11 COVELL, G Second Thoughts on Proguanil [Correspondence] *Brit Med J* 1949, Jan 29, 192

1 A leading article in the *British Medical Journal* deals with the fact that many new pharmaceuticals in the past quarter of a century have failed to live up to the high reputation that early therapeutic trials had engendered. Paludrine, now known as proguanil, is taken as an example. Reference is made to many discordant results with numerous strains of malaria from different parts of the world, which have recently been published. On the debit side it is stated that complaints have been made of loss of appetite, reduction of weight, and lack of energy from some of those who have taken proguanil for considerable periods. A comparison is made of the effects of mepacrine and proguanil respectively, in the treatment of falciparum malaria in West Africa. "It is thus doubtful whether the ideal drug either for the prophylaxis or radical cure of malignant tertian malaria has yet been discovered."

11 COVELL challenges the assertion that proguanil in doses generally used for prophylaxis or treatment has any adverse effect on the digestive system. One of the outstanding advantages of the drug is due to the extremely wide margin between its effective and toxic dosage, it is particularly suitable for prophylaxis and treatment among indigenous populations of malarious countries. A single-dose treatment of 300 mgm for the clinical attack, and a single weekly dose of 300 mgm for prophylaxis have been widely used in India, Malaya and parts of Africa. Large numbers of British troops have been taking 100 mgm of proguanil a day over extended periods, and no reports suggesting an adverse effect on appetite have yet been forthcoming. Covell examines critically the results of experiments by SCHMIDT *et al* on animals [see below] and of those workers primarily concerned with a drug which might inhibit the secretion of gastric juice in the treatment of chronic peptic ulcer, [above] in support of his arguments relating to the effects of proguanil in the dosages used in man for the prophylaxis of malaria [see COVELL *et al*, above]. "It would be most unfortunate if an impression were to be created, on such slender evidence, that the prophylactic use of proguanil is likely to have an adverse effect on the nutrition of any population to whom it is administered."

Norman White

SCHMIDT L H, HUGHES, Hettie B & SMITH, C C On the Pharmacology of N_1 -Para-Chlorophenyl- N_6 -Isopropylbiguanide (Paludrine) *J Pharm & Exper Therap* 1947, July, 1, 90, No 3, 233-53, 1 fig [17 refs]

SPINKS & co workers have reported on the estimation, excretion and tissue distribution of paludrine in laboratory animals [this *Bulletin*, 1946, 1, 43, 400-707 1947 1, 44-55]. The present authors have used rats, mice, dogs and monkeys for a pharmacological and physiological study of the same substance. In the mouse continued oral treatment in sublethal doses did not affect growth or general well-being, in the rat effects were slight. Intramuscular dosage was less well tolerated. In animals generally the chief effect of the drug during chronic toxicity tests with a certain dosage was impairment of appetite with consequent effect on growth. No pathological lesions were noted in the tissues of the rat or mouse. Experiments on dogs and monkeys were conducted in similar fashion the drug being administered by stomach tube. The chief toxic symptoms in the dog were salivation, bilious vomiting and loss of appetite. In fatal cases there was marked haemo-concentration with increase in haemoglobin and red cell count whereas white cell counts did not differ significantly from

normal. Intoxicated animals exhibited bradycardia, but again no gross changes were present in the organs. Recovery from the effects of paludrine was rapid when the drug was discontinued, in marked contrast to the results obtained with quinacrine (mepacrine) or chloroquine. For estimation of paludrine the method noted above was used when absorption and tissue distribution was being investigated. When given by stomach tube absorption of the drug was complete but not rapid. Plasma level reached a peak value in 2 hours and declined to zero within 24 hours. The levels attained were generally in proportion to dosage but differences were apparent in different animal species as well as in individuals of the same species. The amounts present in different tissues during chronic toxicity tests varied widely in different organs but there was no tendency for accumulation except perhaps in the liver at the higher doses. In the rat excretion was mainly in the faeces and to a smaller extent in the urine. Some drug was secreted into the bowel partly in bile. The results obtained from estimation of the amount of paludrine in the tissues and excretions suggested that approximately half the drug administered was being metabolized. Comparison of the toxicities produced by paludrine, quinacrine (mepacrine) and chloroquine showed that the first named possessed advantages in that the adverse effects were confined to the gastro-intestinal tracts were readily detected and easily reversed. The drug moreover did not tend to accumulate like the two latter drugs.

J. D. F. K.

CAYET J. Essais de traitement curatif du paludisme aigu par un nouveau dérivé synthétique la Nivaquine C. [Treatment of Acute Malaria with a New Synthetic Derivative, Nivaquine C.] *Bull. Soc. Path. Exot.* 1943 v. 41 Nos. 9/10 534-8.

The author reports the treatment of 120 patients in Cochín (China) suffering from acute malaria with Nivaquine C. Of these patients 101 were agricultural workers, originally from Tonking. *P. falciparum* 91 *P. vivax* 10 14 are Annamite children aged 2 to 13 *P. falciparum* 10 *P. vivax* 4 5 European adults *P. falciparum* 1 *P. vivax* 4. All had been long settled on a rubber plantation in a hyperendemic malarious region. All had suffered from repeated attacks of malaria and all had large spleens. There was no case of primary infection. All had typical acute attacks of malaria—paroxysms attacks and cases of malarial cachexia were excluded from the inquiry.

All patients received 0.3 gm. of Nivaquine C. a day (adult dose) until two successive blood examinations both failed to reveal schizonts, thick drops and smears were examined night and morning. In *P. falciparum* infections 67 per cent. of patients were free from fever on the second day, 80 per cent. were free from fever on the third evening. In *P. vivax* infections fever disappeared somewhat more rapidly. *P. falciparum* schizonts disappeared in 1 per cent. of cases on the third day, in 57 per cent. on the fourth day and in 20 per cent. on the fifth day. *P. vivax* schizonts were somewhat more persistent, 11 per cent. by the fifth day 87 per cent. of patients were parasite-free.

Nivaquine C. appears to be completely ineffective against the gametocytes of *P. falciparum*.

The author concludes that the antimalarial action of Nivaquine C. is identical with that of quinacrine to which it is comparable inasmuch as it is not very low and it does not discolour the skin. The adult dose of 0.3 gm. is sufficient for the treatment of a typical acute attack, doses as high as 1 gm. a day are well tolerated. For grave forms of malaria and permanent attacks, the author still employs intra-cerebral quinone emulsion. (Nivaquine C.)

CURD F H S, LANDQUIST, J K & ROSE, F L Synthetic Antimalarials Part XXXI 2-p-Chloroanilino-4- β -Diethylaminoethylamino-quinazolines containing various Substituents in the Quinazoline Nucleus *J Chem Soc* 1948, Nov 1759-66

CURD, F H S, HOGGARTH E LANDQUIST J K & ROSE F L Synthetic Antimalarials Part XXXII Some 4-Arylamino- and 4-Arylthio-2-aminoalkylamino-quinazolines, and 2-Arylthio-4-amino-alkylaminoquinazolines *J Chem Soc* 1948, Nov, 1766-73

HEYMANN H & FIESER L F Naphthoquinone Antimalarials XXI Antisuccinate Oxidase Activity *J Biol Chem* 1948 Dec v 176 No 3 1359-62

FIESER, L F & HEYMANN, H Naphthoquinone Antimalarials XXII Relative Antirespiratory Activities (*Plasmodium lophurae*) *J Biol Chem* 1948, Dec, v 176, No 3 1363-70, 1 fig

CIUCA, M, BALIFF, L & CHELARESCO, M, with the co-operation of A TIMISESCO, F VASILIU-MUNTEANU & M V TROFIN Trials of Causal Prophylaxis of Malaria with Paludrine *Bull World Health Organization* 1948, v 1, No 2, 297-300, 3 figs

An old strain of *P. falciparum* used for malaria therapy in Rumania was used in these experiments

Of 5 subjects inoculated with a single dose of sporozoites and given 100 mgm paludrine on the day of inoculation and on the three following days, 2 developed infection after incubation periods of 29 and 35 days, one developed only parasitaemia, the remaining two showed neither fever nor parasites during 57 and 66 days observation, respectively. Of 3 untreated controls one developed a slight infection after 11 days incubation, one an ordinary infection, and the third showed only parasitaemia after a long incubation period.

In a second series, 100 mgm paludrine was continued until the 6th day of the incubation period. Of four patients inoculated with at least 280,000 sporozoites and treated as above, one developed infection after 34 days, and a second parasitaemia after 35 days incubation. The other two developed neither fever nor parasitaemia during observation periods of 23 and 156 days. The dosage in both these series was insufficient to achieve causal prophylaxis.

In a third series, five subjects were inoculated with sporozoites repeated over a period of 4 weeks. They were given 100 mgm paludrine once weekly during this period and two further weeks. They developed fever and parasitaemia 7, 18, 6, 6 and 9 days after the final dose of paludrine. There was no causal prophylaxis.

In a fourth series, 5 subjects were inoculated with sporozoites twice a week over a period of 4 weeks. Paludrine 300 mgm was given once a week during inoculations and continued for a further two weeks. None developed fever and there was no parasitaemia during at least 23 days after final inoculation. Four untreated controls developed the disease after incubation periods of from 12 to 15 days.

Norman White

DAVIDSON, G "Gammexane" and Mosquito Control in the Belgian Congo *Brit Med J* 1949, Jan 15, 101-2

For the purposes of mosquito control water-dispersible powders containing gammexane have been sprayed on the internal surfaces of African houses in a palm-oil plantation and neighbouring villages in Yalgumba, Belgian Congo, aiming at a concentration of 10 mgm of gammexane per square foot.

Eclipse Works pneumatic sprayers have applied 5 pint of spray per 1,000 square feet of surface.

Results so far indicate a very marked reduction in the number of anopheline mosquitoes caught by four methods —

(a) Pyrethrum in kerosene spray and white sheets on the floor

(b) Window-traps to catch mosquitoes leaving each morning

(c) Mosquito net traps attached to a bed, which show numbers of mosquitoes entering at night to bite occupants of one bed.

(d) The personal calico nets of the inhabitants, acting as traps because of bad state of repair or incomplete closure. This result is expressed as a percentage of nets containing mosquitoes.

The unreliability of estimating the persistence of the insecticide by determining mosquito densities by the bit-catching method alone has been clearly demonstrated. Fifteen or sixteen weeks appears to be the period of maximum effect of the insecticide.

The principal anopheline is *A. monochelis* which breeds at the edges of the large rivers in this tropical forest type of country: a few *A. gambiae* and *A. falcatus* occur. Salivary gland dissections (tabulated) indicate an absence of infected mosquitoes in the treated villages as compared to 0-40 per cent *A. monochelis* and 4-17 per cent *A. gambiae* infections in untreated villages.

For malaria control purposes in this particular area it is thought that an initial spraying of the whole area three times during the first year can be reduced to twice a year.

[This is a preliminary report and will be followed by a more detailed account.]

R. Ford Trevel

HEISCH R. B. & WILSON D. O. Preliminary Trial with 5 lb. DDT Smoke Generators against Mosquitoes. *East Afr. M. J.* 1948 Oct. 25 No. 10 400-404.

An endeavour to assess under field conditions the value of DDT smoke as a means of killing adult mosquitoes and larvae at their natural breeding places yielded inconclusive or negative results.

The methods of assessment were by the exposure of adult mosquitoes in cages, the exposure of larvae in bowls and the counting of larvae in the swamp. The numbers of survivors were high and, under the conditions of the experiment the mortality may or may not have been due to DDT.

The authors concluded that the 5 lb. DDT smoke generator is unlikely to be of any value in malaria control in East Africa.

[The result of the analysis of swamp vegetation for DDT deposit is not included.]

R. Ford Trevel

DA COSTA A. M. & BASSÈRES M. S. Ação do DDT sobre o *A. darlingi* e *A. albopictus* e outros Culicídeos. [Action of DDT on *Anopheles darlingi* and *A. albopictus* and other Mosquitoes.] *Rev. Serviço Especial de Saúde Pública* Rio de Janeiro 1948 Mar. v. 1 No. 4 997-1008. 1 graph. English summary.

These experiments were made at Alfredo Maia, Brazil during 1946 and 1947. Weekly collections of anophelines from houses during the previous two years had shown that the number varied between 6.6 to 7.5 per standard collection.

Ten of the houses were then sprayed with DDT in water at 3.5 gm DDT per square metre, ten others at 2.5 gm DDT per square metre, similar groups of houses were treated with 2½ per cent DDT in kerosene at the same rates, seven houses were treated with a pyrethrum insecticide at 2 gm pyrethrum per square metre and ten houses were untreated.

Collections of mosquitoes were made from all houses for twenty-seven weeks after treatment. These captures were separated into *Anopheles darlingi*, *A. albiparvus* and "other mosquitoes". The weekly figures for living and dead mosquitoes taken from each group of houses are given in tables.

The total numbers of mosquitoes found dead in each experimental group are given as —DDT/water at 3.5 gm, 197 (93.8 per cent), DDT/water at 2.5 gm, 72 (93.5 per cent), DDT/kerosene at 3.5 gm, 86 (80.0 per cent), DDT/kerosene at 2.5 gm, 100 (73.0 per cent), pyrethrum, 30 (27.3 per cent) and in the control group of houses, 9 (2.6 per cent). The two concentrations of DDT in water were equally effective. During the last few weeks of the experiment, the number of mosquitoes captured alive in houses treated with DDT in kerosene formed 85.4 per cent of the total number of living mosquitoes found in DDT-treated houses, the authors therefore consider that DDT in water suspension has better lasting qualities than DDT dissolved in kerosene.

H S Leeson

DEANE, L M, FREIRE, E P S, TABOSA, W & LEDO, J. A aplicação domiciliar de DDT no controle da malária em localidades da Amazônia. [House Spraying with DDT in Malaria Control in Amazonia] *Rev Serviço Especial de Saúde Pública* Rio de Janeiro 1948, May, v 1, No 4, 1121-61, 9 figs. English summary.

An account is given of a large-scale programme of residual spraying with 5 per cent DDT in kerosene in buildings in the Amazon region of Brazil, having as its ultimate aim the prevention of malaria by the destruction of its vector *Anopheles darlingi*.

The results obtained in 1945 in the small town of Breves were so successful that the treatment was extended to other areas, and by September, 1947, a total of 27 areas, with a population of approximately 33,000, were being treated. At first, the spraying of the houses was done every two months but later a four-month interval was established. Some localities were regarded as experimental areas, but in others the treatment was applied to all buildings (7,303).

The inner surfaces of the walls were sprayed to a height of 3 metres at an average concentration of 2.113 gm DDT per square metre.

A survey in Breves before spraying started, showed that 22 per cent of the blood slides were positive for plasmodia and gave a spleen rate of 45 per cent. In May, 1946, after one year of bi-monthly spraying, these rates were 1.5 and 16.8 per cent respectively, a year later they were 0.3 and 8.3 per cent, respectively. Three months after spraying started, no *A. darlingi* could be found in the houses, and after the sixth month only sporadic cases of malaria occurred. Among children born during this campaign there was no malaria.

In other towns, surveys made before and after DDT treatment, showed that the parasite rate fell from 9.9 to 3.1 per cent and the spleen index from 24.6 to 13.7 per cent. The number of malaria cases was only 43.3 per cent of the number recorded before treatment during a corresponding period, but in untreated localities this figure was 90.9 per cent.

In Manaus, Amapá, Macapá and Mazagão, *A. darlingi* had either become very rare or had completely disappeared from houses.

Methods are described and costs are given, as also are the complete figures for each locality, maps of the areas and samples of the record forms. Photographs show details of the type of equipment used.

H S Leeson

4) out. By estimation of quinine in plasma the authors (this Bulletin, 1943 v. 43-404) have shown that, in contrast to the known facts about antiparasitic drugs, the maintenance of a certain concentration in blood was not necessary for the suppression of *P. lopharii* infections in ducks. Studies by other authors have indicated that in the case of certain infections the same is true of penicillin and streptomycin. The results are of theoretical and practical interest.

J. D. F. n.

BACIGALUPO J. Etapa invisible del *Plasmodium gallinaceum* Brumpt, 1911 (An invisible stage of *Plasmodium gallinaceum*.) *Seminario M.D.* 1947 Dec. 2 v. 55 No. 49 1151-4

The author in 1943 obtained a strain of *P. gallinaceum* and has kept it going. Examination of the plasma of infected birds did not reveal any parasites, nevertheless injection of it did, in some cases, set up infection. The question then arose as to whether the infective material was or was not capable of passing through a filter—the disk sterilizing filter of the Filter Corporation, New York.

The plasma diluted with Ringer's solution and injected intramuscularly caused the signs of infection to appear in 8-18 days whereas when injected similarly after dilution and filtration infection was observed in 25-30 days. Intracerebral inoculation of blood containing parasites might give rise to symptoms as early as 15 hours after or as late as 4 days.

The author discusses the possible implications of these results.

H. Ha. and Sc. 7

LEWERY R. M. Exoerythrocytic Infection by *Plasmodium gallinaceum* in Blood-Infected, Quinine-Treated Chicks with special reference to the Central Nervous System. *Amer. J. Hyg.* 1948 Sept. v. 48 No. 3, 194-208 coloured figs. on 1 pl. [13 refs.]

An account is given of the sites of invasion in the tissues of the chick, treated with quinine by the exoerythrocytic forms of *Plasmodium gallinaceum* with special reference to the forms seen in the brain. The infections were produced by blood inoculation and the results of the experiment may be summarized shortly—

- All parts of the brain were invaded by exoerythrocytic parasites.
- Although the intensity of the infections varied in individual there was a general agreement with regard to the parts of the brain most highly parasitized. The difference in parasite density appeared to be directly related to the richness of the capillary circulation, the parasitism being greatest where the capillaries were most numerous and especially where they were relatively unbranched.
- The quinine therapy suppressed the primary parasitaemia but when the exoerythrocytic density became great, young ring forms of the erythrocytic series, unaccompanied by older forms were able to invade the erythrocytes.
- Blocking of the capillaries is due both to swollen parasitized endothelial cells of the capillaries and to free embolic schizonts.
- Stickiness of the capillary endothelium developed only after the establishment of the infection in the capillaries.
- The endothelium of the brain capillaries is invaded before that in other organs and tissues.

The paper is illustrated by a coloured plate

H. E. S. 400

HAWKING, F. & PERRY W. L. M. Activation of Paludrine. *Br. J. Parasitol. & Chemotherapy* 1948 Dec. v. 43 220-25 1 fig.

It was found by TONKIN (this Bulletin 1947 v. 44 184) that paludrine was inactive against the exoerythrocytic forms of *P. gallinaceum* in vitro. In vivo

of the *in vivo* activity it was concluded from preliminary experiments [*ibid.*, 1947, v 44, 648] that the drug was activated by host cells. Further evidence of this activation is now given. Sterilization of cultures was obtained by addition of serum from a fowl treated with paludrine, but none if the drug was added directly unless it were added in a concentration toxic to the cells themselves. LEVADITI and YAMANOCHI (*C R Soc Biol*, 1908, v 65, 23) showed that incubation of atoxyl with rabbit liver rendered this substance active against trypanosomes *in vitro*. Paludrine has been found to be activated by using rat liver. Calculation showed that only a very small amount of the active material formed could have been present in the cultures. ACHESON *et al* [this *Bulletin*, 1947, v 44, 964] have shown that the active substance is probably not a benzimidazole derivative derivable from paludrine itself. Experiments with the monkey parasite *P. cynomolgi* gave similar results to the above. The authors concluded that paludrine itself is probably not the active antimalarial agent but rather some substance derived from it by the action of body cells. This substance was not bound to protein and was stable at 100°C. J. D. Fulton

MICKS, D. W., DE CAIRES, P. F. & FRANCO, L. B. The Relationship of Exflagellation in Avian Plasmodia to pH and Immunity in the Mosquito. *Amer J Hyg* 1948, Sept., v 48 No 2, 182-90, 1 fig [16 refs.]

The study which is the subject of this paper was undertaken to investigate the factors underlying the inability of certain species of mosquitoes to act as hosts for various avian malaria parasites, especially *Plasmodium elongatum*. The other species used were *P. cathemerium* and *P. relictum*, while the mosquito species investigated were *Culex pipiens*, *C. quinquefasciatus* [*C. fatigans*], *Aedes aegypti* and *Anopheles quadrimaculatus*.

Exflagellation preparations were made in two ways and observed at room temperature. In the first method, a drop of bird's blood was mixed with a drop of isotonic saline-citrate solution and the mixture sealed under a coverslip. In the second, the last two abdominal segments were cut off a mosquito immediately after it had fed, the blood was expressed on to a slide and sealed as before.

On the assumption that the hydrogen-ion concentration in the gut might be the important factor concerned in the varying susceptibility of mosquitoes to infection, the pH values of the contents of mosquitoes' stomachs were investigated. The Beckman pH meter was used and the pH values of the stomach contents of both unfed and fed mosquitoes were determined.

In the case of *P. elongatum*, it was noted that exflagellation did not take place in preparations made from the bird's blood but took place readily and rapidly in the contents of the mosquitoes' stomach (*C. pipiens*). On the other hand, such exflagellation did not take place when the mosquitoes used were *Aedes aegypti* and *A. quadrimaculatus*. This seemed to indicate the presence of some factor in the stomach of *C. pipiens* which provoked exflagellation.

It is unnecessary to describe the various other experiments carried out with the species of *Plasmodium* and mosquitoes previously mentioned but a summary of the conclusions arrived at may be given—

1. No correlation could be shown between exflagellation and pH values.
2. The insusceptibility of a mosquito to infection can manifest itself sufficiently early to prevent even exflagellation.
3. Some chemical factor provoking exflagellation and fertilization of *P. relictum* is present in the stomach of *C. pipiens*.
4. In the stomachs of *Aedes aegypti* and *A. quadrimaculatus* a factor inhibiting exflagellation of *P. relictum* is present.
5. The stimulating factor in *C. pipiens* is activated by the ingestion of blood.

H. F. Stern

BLACKWATER FEVER

RAOULT A. E. du traitement de la fièvre bilieuse hémoglobinurique par Neo-Antergan. [Treatment of Haemoglobinuric Fever with Neo-Antergan. *Bull. MEd de l'Afrique Occidentale Fr* 1947 v 4 No. 2, 1944]

The use of a synthetic anti-histamine preparation, such as neo-antergan, in the treatment of haemoglobinuric fever was suggested by the analogy between the sudden onset of haemoglobinuria and of other grave complications of malarial attacks, and histamine shock. The author believes that a discharge of histamine is directly responsible for the haemolysis, the natural antihistamine defence of the body being defective, the liver ceasing to play its neutralising rôle.

A child 8 years of age, infected with *P. falciparum* developed rhythmic febrile attacks of haemoglobinuria. The usual treatments including quinine, antivenene, calcium, biocholone and blood transfusions had failed to arrest the attacks and the progressive anaemia. The child was then given 0.5 gm. of quinofilm intramuscularly and 3 tablets of neo-antergan by mouth, at intervals of two hours. The quinofilm was continued for 3 more days and the neo-antergan, 3 tablets a day for a week. Suppression of both haemoglobinuria and albuminuria followed promptly the administration of neo-antergan.

To overcome the difficulty experienced in giving drugs by mouth to patients with haemoglobinuric fever a preparation of neo-antergan suitable for intramuscular injection was prepared for the author. He treated 3 other cases similar to the first by intramuscular injections of neo-antergan and quinacrine. In all cases the haemoglobinuria responded promptly to the medication. The subsequent administration of quinine produced no unfavorable results.

YVES R. ITARD

BRUZAT & BOCCART. Anémie au cours d'une fièvre bilieuse hémoglobinurique. Traitement chirurgical. Avant-propos de J. BOCCART. (Surgical Treatment) of Anaemia during Blackwater Fever. *Bull. Trop. Maladies* 1944 July-Aug. Sept.-Oct. 8, No. 4 427-31

Report of a case which was ultimately fatal.

TRYPANOSOMIASIS

JACKSON C. H. \ Some Further Isolated Generations of Tsetse Flies. *Bull. Entom. Res.* 1948, Dec. v 39 Pt. 3 411-51

Further experiments are reported [see this *Bulletin* 1948 43 31*] in which tsetse flies are liberated in an area in which they do not naturally occur and studies made on age, reproduction etc. under these conditions.

The area chosen for an experiment is judged to be not unsuited to the liberated species, which is therefore living under almost natural conditions. As liberation is from pupae and is limited to three days, the age of any fly which is subsequently recaptured is known. The distance it has moved from the point of liberation can also be studied. In each experiment tsetse were liberated in a place in which there is already a closely related native species, thus *G. morsitans* and *g. swinhoei* were liberated in one another's haunts. The general condition of the native community gives a general indication of what the introduced species will encounter.

In the four experiments here discussed (in which *morsitans* and *g. morsitans* were the introduced species) the author compares these flies, using physiological criteria, with others in their native haunts. He also studies their gradual

disappearance, and finds fresh evidence that the males are rather inactive for the first four weeks of life. This modifies previous calculations on length of life in nature, and estimates of population. It seems that the wear and tear of the wing ("wing fray") proceeds at much the same rate at different seasons, so that it may develop into a means of measuring the mean age of groups of tsetse. Unusually small flies, perhaps the smallest 10 per cent, seldom live long enough to take a meal of blood. Size of offspring depends on the mother's nutrition during pregnancy, it follows that some apparently minor unfavourable factor might have a marked effect on the numbers in a population of tsetse.

The three larval instars are distinguished, and identified in recaptured specimens of the introduced species, of which the age is known, as explained above. At a screen temperature of 24°C a large larva has been found in the uterus on the 23rd day. There seemed to be considerable irregularity in the commencement of breeding, but perhaps this was due to the experimental conditions. The first flies of the second generation were captured (soft and unfed) on the 53rd day.

P A Buxton

MOGGRIDGE, J Y Night Activity of Tsetse (*Glossina*) on the Kenya Coast
Proc Roy Entom Soc London Ser A Gen Entom 1948, Dec 28,
v 23, Pts 10/12, 87-92

The author has made observations on the adult of *Glossina austeni*, a species which is normally regarded as seldom biting man. He finds that on the Kenya Coast, and especially in the dry season, this insect bites man readily at night. Considerable numbers were caught by a party moving along a path in the bush after midnight carrying no lights. As the insects bite irrespective of the state of the moon and are prepared to do so on a very dark night, the view that their sense of smell is important in finding a host is to some extent strengthened. As soon as day breaks, the attack of these insects on man ceases, except that in very dry weather there is a period of "rush activity" they then attack man fiercely for a brief period in the very early morning.

P A Buxton

LAUNOY, L Prophylaxie chimique par voie orale, chez le rat, de l'infection expérimentale à *Trypanosoma gambiense* (souche Yaoundé) [Chemo-prophylaxis by the Oral Route against the Yaounde strain of *T. gambiense* in the Rat] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 464-70, 4 figs on 2 pls

This contribution covers the same ground, with some slight differences of detail, as a recent paper under almost an identical title by the same author [LAUNOY, this *Bulletin*, 1948, v 45, 1071]

An interesting point mentioned in the present report is that the strain of *T. gambiense* used has retained its infectivity for man after being maintained in laboratory animals for 14 years, as proved by an accidental human infection in Paris in December 1947.

E M Lourie

DEWEY, H M & WORMALL, A Studies on Suramin (Antrypol, Bayer 205)
6 Further Observations on the Determination of Suramin in Whole Blood and Serum *Biochem J* 1948, v 43, No 1, 24-7 [12 refs]

Simple methods for the estimation of suramin (Antrypol, Bayer 205) in serum and plasma, by means of acid hydrolysis followed by diazotization, have already been described [this *Bulletin*, 1938, v 35, 714, 1939, v 36, 668]. In view of the possibility of bacterial contamination in specimens

kept for some time and subsequent production of substances which would vitiate the result of the colorimetric estimations the effect of addition of various antiseptics to the test specimens has been investigated. In the case of oxalated and defibrinated whole blood or of washed red cells the recoveries of added suramin in contrast to those with plasma or serum, were low and variable when hydrolysis was carried out for the usual 6 hours and were not improved by increasing the reaction time. Some constituent of the red cells, or product derived from them, is apparently responsible for the low results obtained. If however hydrolysis in those cases is carried out before the addition of suramin satisfactory results are obtained. The amount of suramin which combines with red cells when added to whole blood or as a result of injection in animals is negligible. The addition of 0.2 ml. of 5 per cent. (w/v) phenol or half that amount of 0.5 per cent. merthiolate added to 2 or 3 ml. of plasma or serum did not interfere with satisfactory recoveries of suramin.

J. D. Fulton

GALE J. C., ROSE F. L. & SCOTT MARY. The Estimation of Suramin in Plasma. *Biochem. J.* 1948, v. 42, No. 4, 574-72 figs.

Methods for the estimation of suramin (Bayer 203 Antrypol) have been described in which the acid or alkaline fission products are converted to an azo dye [this *Bulletin* 1933, v. 35, 714; 1943, v. 45, 772]. In the present investigation a method for estimating suramin in aqueous solution, plasma or serum is described, which depends on the colour change produced when the drug is added to a styrylquinoline dye (SQ34). Plasma proteins do not interfere with the formation of the dye complex and the estimation depends on a comparison of optical densities in a Coleman spectrophotometer or a Spekker absorptiometer. The values obtained are referred to a standard curve constructed with known amounts of suramin. The method was compared with that employing the acid hydrolysis referred to above and is claimed to have equal precision and slightly greater sensitivity. It also proved simpler and less time-consuming and should have advantages in field work. A number of possible hydrolysis products were also estimated by the newer method. It was found that only certain types took part in the formation of the coloured complex and showed a correlation with the time of persistence in the blood.

J. D. Fulton

VAN HOOF L., HENRAED, C. & PHIL, E. Quelques observations sur les trypanosomes des grands mammifères au Congo Belge (Observations on Trypanosomiasis in Large Mammals in the Belgian Congo; *Acta Tropica*, 1943, v. 5, No. 4, 327-44 [13 refs.])

(1) CORD F. H. S. & DAVEY D. G. "Antrycide": a New Trypanocidal Drug. *Nature* 1949 Jan. 15, 89-90.

(2) *Nature*, 1949 Jan. 15, 77-8. Sleeping Sickness and Nagana.

(3) "Antrycide" gives promise of a remarkable degree of activity against *T. congolense* besides being highly active also against trypanosome species which are normally more amenable than *T. congolense* to chemotherapeutic treatment.

The name Antrycide is applicable to the various salts of a bis-quaternary base whose formula is given, in which substituted pyrimidine and quinoline rings are connected by an imino linkage.

The following results are given for therapeutic tests in mice with one of the "Antrycide" salts (doses per kgm body weight, subcutaneously) —

<i>T rhodesiense</i> (Tinde)	25 to 5 mgm inclusive, curative Lower doses not quoted
<i>T brucei</i> (Liverpool)	5 mgm, some cures 2.5 mgm, blood temporarily cleared
<i>T congolense</i> (Busumbi)	1.0 mgm, curative 0.5 mgm, some cures 0.25 mgm, blood temporarily cleared 0.125 mgm, blood sometimes temporarily cleared
<i>T evansi</i> (India)	1.25 mgm, curative 0.5 mgm, some cures
<i>T evansi</i> (Sudan)	2.5 and 1.25 mgm, some cures 0.5 mgm, blood temporarily cleared
<i>T equiperdum</i>	0.5 mgm, curative 0.25 mgm, some cures
<i>T equinum</i>	1.25 mgm, curative 0.5 mgm, some cures

Considerable prophylactic action was demonstrated in mice, rats and rabbits. Thus, 12.5 mgm per kgm body weight completely protected mice against *T congolense* (Busumbi) inoculated 28 days later.

In trials now proceeding in Africa, single doses of "Antrycide" salts have already produced cures of *T congolense*, *T vivax* and *T brucei* infections in cattle, of *T brucei* in horses, donkeys and dogs, and of *T evansi* in camels. Considerable protective power has also been demonstrated against *T congolense* and *T vivax* infection in cattle.

(u) This leading article was inspired by the discovery of "Antrycide", referred to in the abstract above. The first public announcement of "Antrycide" was made at a Press conference held jointly by the Colonial Office and Imperial Chemical Industries, Ltd on December 29, 1948.

The article refers to the severe limitations which tsetse flies have imposed on the development of tropical Africa. Mention is made of some of the methods now in use for controlling trypanosomiasis in man and animals, either by measures directed essentially against the fly or against the trypanosome, and the large measure of success already achieved is acknowledged. "There are some hundreds of thousands of people, and their cattle, living where they could not have lived before. Still larger numbers have been protected from sleeping sickness by the use of drugs, and now that it is possible to treat cattle themselves, an even larger area will be available for development." A warning is nevertheless sounded against the expectation of producing any immediate and widespread improvements in food-production or human settlement, in view of technical difficulties of dealing with large numbers of cattle which have never been handled and which range over large unfenced areas.

Mention is rightly made of the other important advance of recent years in the chemotherapy of *T congolense*, namely the introduction of phenanthridinium compounds, culminating in "Dimidium bromide", [reports on which have been conflicting, and the relative value of which has accordingly not yet been finally established]

E M Lourié

GANAPATI, P. N. Cultivation of *Trypanosoma cruzi* in the Developing Chick Embryo [Correspondence] *Nature* 1948, Dec 18, 963-4, 2 figs

Tissue culture of *Trypanosoma cruzi* in the embryonic tissues of the chick is readily carried out, but attempts to cultivate this parasite in the chick embryo itself have been less successful. The account given in this note records the

successful cultivation of *T. cruzi* on the chorioallantoic membrane of the chick embryo both blood forms and cultural forms were used as the inoculum.

The eggs were used after 10-14 days incubation and the inoculation was made by the standard technique of Beveridge and Burnet. The eggs were opened from the third day onwards. All the chicks died before hatching.

The lesions on the chorioallantoic membrane were whitish opaque patches. Sections showed that the infection was in the ectodermal layer which contained numerous "cyts" enclosing large numbers of *T. cruzi* in all stages of multiplication. The mesodermal layer is not involved. *H. E. Shaw*

PIZZI T. & ALLS J. & FLORENZANO R. Estudio preliminar sobre la cardiopatía chagásica en la zona central de Chile. [Preliminary Study of Cardiopathy in American Trypanosomiasis in Central Chile.] *Rev. Med. Chile* 1949 June v 78 No. 6 315-23

The authors examined 411 patients proved by xenodiagnosis to be suffering from Chagas's disease. 397 electrocardiograms were made and 43 showed definite departures from the normal. Among 86 controls four showed abnormalities: one with blocking of the left ramus (with hypertension and cardiac insufficiency) others were slight alterations in the ST segment and the T-wave. The authors conclude that myocardial affections in this disease are neither common nor severe in the zones investigated; the most important are A-V block, especially of the right ramus.

As the authors agree, the study is not very complete because they had no portable X-ray apparatus, nor could they make electrocardiograms on all the patients; on the other hand, controls were few in number, only 86, and they could not be certain that none of them was infected with the disease since they lived in the same districts as the positive (rather serious drawback to the validity of the conclusions). *H. Harold Scott*

LEISHMANIASIS

BAIKEMANN E. Kala-Azar bei einem Holzknecht. [Kala Azar in a Repairman.] *Dtsch. med. Woch.* 1948 Aug. 13, v 73, No. 29-31, 248.

A case in an ex-prisoner of war from Turkey.

BOZZO A. & CANU G. Su un caso di sepsi letale da paratifo A in soggetto con leishmaniosi viscerale. [A Case of Subacute Bacterial Endocarditis associated with Kala Azar.] *Atti Vel. Italiana* 1948, Nov. v 3, No. 11 381-5 1 chart. (14 refs.)

The English summary appended to the paper is as follows:—

"A case of subacute bacterial endocarditis caused by *Salmonella paratyphi A* in a patient with kala-azar has been presented. The authors call attention to the rarity of this aetiology and to the association of subacute bacterial endocarditis with leishmaniasis.

TRAVASSO B. Lo kala-azar su Dodécandee. Foyers et observations. [Kala Azar in the Dodécandee.] *J. Roy. Egyptian Med. Ass.* 1948 Oct. 31 v 10 257-8 (Recd. 12 Dec. 1948)

DEWEY J. P. & DAUBON L. E. Kala-Azar. 3 Cases developing in Veterans. *Amer. J. Med. Sci.* 1949 Jan. 217 v 1 31-7 6 refs.

Two cases from India and one from Africa, occurring in U.S. ex-servicemen.

CHUNG, Hui-lan, CHOW, Hua-k'ang & LU, Jui-ping The First Two Cases of Transfusion Kala-Azar *Chinese Med J* Shanghai 1948, June, v 66, No 6, 325-6 [10 refs]

This paper describes the apparent transmission of kala azar to two children by blood transfusion from a mother suffering from the disease. On diagnosis of the mother's condition, made after the transfusions, a close watch was kept on the two children. Kala azar was diagnosed in each after the lapse of nine and ten months respectively.

[There is no reason to doubt that the most probable cause of the disease in the two children was the blood transfusion, since *Leishmania donovani* is constantly present in the blood of untreated cases. None the less, the possibility of transmission by *Phlebotomus* flies from mother to child cannot be excluded in spite of the recorded fact that the premises were "well screened against insects as it was occupied by a well-known parasitologist." After all, the mother had acquired the infection without blood transfusion.] *H E Shortt*

DANA, R, CORCOS, A & SEBAG, A Deux cas de kala-azar chez un adulte et chez un enfant guéris par le 2168 R P [Glucantime] [Two Cases of Kala Azar, an Adult and a Child, cured by Glucantime (2168 R P)] *Bull et Mém Soc Méd Hôpit de Paris* 1948, Nos 20/21, 644-8, 2 charts

Two cases of kala azar are reported. One a young woman aged 27 years from Tunisia, complained of fever with rigors and sweating, weakness, and loss of appetite of about 6 months' duration. Her spleen was four fingers' breadth below the costal margin and the liver was enlarged. *Plasmodium vivax* schizonts were found in the blood. Anti-malarial treatment brought down the temperature for about 8 days, but the fever returned and on this occasion *P falciparum* parasites were found. Despite further anti-malarial treatment, irregular fever persisted, the spleen now reached to the crest of the ilium, and the liver was four fingers' breadth below the costal margin. The inguinal and axillary lymphatic glands were enlarged. Leishmaniae were found on sternal puncture. The leucocyte count was 630 per cmm and the haemoglobin 32 per cent.

The patient was treated by "glucantime" (2168 R P) intramuscularly, in 15 doses, 5, 5, 6, 8, 10 × 8, and 12 × 3 ml = 140 ml (=11.30 grammes of antimony), on alternate days. The temperature fell after the second injection. After this course the spleen and liver were reduced to less than half their previous size and the blood picture improved (haemoglobin 58 per cent). Control sternal puncture was refused, but over 3 months later the patient was reported to be in excellent health with no return to fever.

The second case was in a child of 5 years from Beja (Tunisia), with an oscillating temperature (37.5° to 39°C), anaemia (62 per cent haemoglobin), leucopenia (2,100 per cmm), a large spleen reaching almost to the iliac crest, and an enlarged liver. Leishmaniae were found on sternal puncture. The same drug was given in 15 doses of 2.5, 4, 5 × 4, and 6 × 9 ml = 75 ml [*sic* ? 80.5 ml] corresponding to 19.50 grammes of the product (presumably a 25 per cent solution). The temperature fell and remained below 37°C after the 4th injection, the spleen and liver were reduced, and the leucocyte count rose to 5,500 per cmm after one month. Sternal puncture was now negative. The child, still in excellent condition, was readmitted after three weeks and given a second similar course of 15 injections totalling 88 ml.

The authors emphasize (i) the danger of overlooking kala azar in patients with malaria especially when the splenomegaly persists after the temperature has fallen and (ii) the excellent results they obtained with glucantime (2168 R P).

[There is no information on the formula of 2168 R.P. but from its dosage and antimony content it might be identical with sodium antimony glucosate
L. E. Nisbet

Ho E. A. Hsu Tze-hui & Li Y. A Report on Examination of 994 Dogs in Shan and Its Nearby Villages for Leishmaniasis. *Chinese Med J Shanghai* 1948 July v 66, No 7 337-9 [11 refs.]

"Four of 483 dogs examined in Shan were found to have visceral leishmaniasis with cutaneous manifestation, but among 506 dogs examined in 47 nearby villages none showed the infection."

CARLEONI G. Contributo allo studio della leishmaniosi cutanea. [Cutaneous Leishmaniasis.] *Giorn di Med Milit.* 1948, Mar-Apr., v 83 No 2, 127-9

Much has been compressed into a small space in this concentrated account of the treatment of cases of cutaneous leishmaniasis. The figures throughout are given as percentages—a little inclined to mislead when the total dealt with were 31, 29 and 25 in different parts of the contribution.

Of the 31 Italian prisoners of war under the author's care and suffering from oriental sore, 23 came from the Province of Gondar, 4 from Cyrenaica and each from Eritrea and Asmara [stated as 75 per cent. of cases coming from Gondar Province]. There was none from Somalia or southern Ethiopia. The incubation period, i.e. the time between leaving the infective area and the appearance of symptoms, was 2-5 months in 24 per cent., 7 or 8 patients; 7-12 months in 32 per cent. [10?]; 13-4 months in 24 per cent., 24-36 months in 16 per cent., over 36 months in 4 per cent. [1 or 2?]; the longest period was one of 57 months.

Several methods of treatment were tried: trivalent antimony intravenously and intramuscularly with formalin and antihomaline; pentavalent stibocin intramuscularly; stilbenylurea intravenously; all without benefit. Local infiltration with antihomaline was equally ineffectual. In 4 patients good results were obtained with antimony ointment or urea-antimony 2 per cent., cure resulting in 60, 62, 90 and 30 days. Local injections of emetine proved very serviceable, but it cannot be used near the eyes as it set up a violent conjunctivitis. Atebrin [mepacrine] injections brought about cure in a month and a half in 4 patients with oriental sores ranging in size from that of a chickpea to a kidney bean. Those in whom the lesion was extensive, ulcerated and lupoid were more resistant. Of 25 such 10, stated as 40 per cent., were cured in 45-80 days; 4 [16 per cent.] in 80-110 days; 5 apparently cured relapsed, but were definitely cured by a second course of the atebrin injections. Resistance to atebrin treatment is ascribed to local conditions, because in the same patient one sore might rapidly clear up while another would again and again relapse. In the remaining 6 relapse persisted in spite of repeated injections. In 4 of these satisfactory results followed the application of sulphamide in powder after cleaning and deep scraping of the ulcer. The powder was applied at first every day, then every second, third and fourth day. [no other details are given] cure was obtained in 29, 30, 30 and 45 days. H. Harold Scott

PÉREZ CHAVARRIA, A. GUARES ARIAS, J. C. ROMERO LÓPEZ, A. I. ULLI, J. H. M. & CASTRO JENKINS, A. Leishmaniasis tegumentaria en Costa Rica. Se propone una clasificación dermatológica de la leishmaniasis tegumentaria. [Cutaneous Leishmaniasis in Costa Rica. A Proposed Classification according to the Skin Lesions. *Rev Med Cost Ric* 1948 July-Dec., 7 No 147/15, 66-97, 4 figs & 1 map, 89 ref.]

Cutaneous leishmaniasis is endemic in Costa Rica—cases can be seen at all seasons but increase in number with the wet season and mostly at the levels

of some 700 metres above sea-level *Phlebotomus* abounds in all the affected regions

In this article, 100 cases are analysed 54 from the Province of Limon, 20 from Alajuela, 16 from San José, 5 from Guanacaste, 2 each from Cartago and Puntarenas and one from Heredia As regards sex, the authors state that men are more attacked than women [but no other reference is made to the sex and a tabular statement gives "86 males, 84 females," an obvious mistake in a total of 100 patients] Clinical forms are divided into 1, those with rupial ulcers (*ulcero-costrosas*), much the most numerous (84), 2, vegetating and rupial (7), 3, affecting the legs only (5), 4, vegetating lesions only (3), raised papule (*botón*) (1) [Not a very satisfying classification There are other errors in the table than that referred to above In the table, analysing 100 cases is the statement, giving the ages "Children under 1 year, 18, to 10 years, 4, and 10 to 80 years, 96, a total of 118] H Harold Scott

PESSOA, S B & VILLELA, F F Estudos sobre o tratamento da leishmaniose tegumentar americana pelo eparseno [On the Treatment of American Cutaneous Leishmaniasis by Eparseno] *Hospital* Rio de Janeiro 1948, Oct, v 34, No 4, 527-32

Eparseno (dioxy-diamido-arsenobenzol) is put up in 1 cc ampoules each containing 0.12 gm of amino-arseno-phenol and is given intravenously In 1926, Pupo reported the results of its use in muco-cutaneous leishmaniasis [see this *Bulletin*, 1926, v 23, 586] It has usually been given at 2-3-day intervals for adults, in a series of 10-15 ampoules, repeating the course after an interval of 10-15 days and so on until 40-50 ampoules, or 4.8-6 gm of the salt have been given

In the present communication, the authors report having tried two methods In the one they give increasing doses beginning with one ampoule, then increasing at two-day intervals to 2, 3, 4 and in one case 5 ampoules for a single dose, with a resting period of 3-5 days after the third or fourth injection For example, one patient received on January 4th 1 cc, January 6th 1 cc, January 8th 2 cc, January 12th 2 cc, January 17th 3 cc, January 22nd 3 cc, then a rest for 10 days [so stated, but the dates would show a rest for 13 days] February 4th 3 cc and the same dose on the 6th, 8th, 11th, 15th, 18th and 22nd, altogether 33 ampoules or 3.96 gm of the salt

Of 15 patients so treated, six showed toxic signs, four of them severe, but cicatrization occurred, two relapsed

By the other method the dose was kept constant at 1 cc, but injections were made daily for 10 days, then after an interval of 10-15 days a repeat and so on until 40-50 ampoules had been given Eight patients were treated in this way Six were cured, a seventh relapsed 8 months later, in the other cicatrization was incomplete and the treatment was changed for antimony None showed any signs of intoxication and the authors consequently regard the second plan—daily administration of the constant dose—as the better H Harold Scott

FEVERS OF THE TYPHUS GROUP

ERZİN, N İkinci dünya savaşı yıllarında yurdumuzun tifus durumu [Typhus Fever in Turkey in Years of World War II] *Türk İhtiyar ve Tıbbi Biyoloji Dergisi* Ankara 1948, v 8, No 3, 5-9, 1 chart English summary 10-12

An epidemic of typhus occurred in Turkey in 1942 and reached its peak in 1943-44 A reduction in the number of cases to pre-war level did not occur until 1947

The average incidence and mortality in the 10 years before the war (1928-1938) the 4 years up to 1942 and from 1943 to 1947 are shown in a series of tables.

The average number of cases in the 10-year period 1928-1938 was 711 in 1939-1942, 759 and from 1943 to 1947 the actual numbers were 414, 231, 265, 1498 and 641.

It is shown that most of the cases occurred between January and May and particularly in March. This is attributed by the author to lack of communications, which limits the spread of the disease in the winter months.

The incidence of typhus and death rates per 100,000 for different periods were as follows —

Incidence			Death rate	
	Number	Average per 100,000	Number	Average per 100,000
1935-39	475 (yearly average)	2.9	58 (yearly average)	0.3
1940-44	003	11	189	1.0
1945	2,634	13.8	139	0.7
1946	1,498	7.8	103	0.5
1947	641	3.4	58	0.3

The fall in incidence from 1944 onwards is attributed largely to mass vaccination and the use of DDT. Mass vaccination was begun in 1943 and another table shows that the mortality rate from typhus fell from 14.1 in 1942 to 5.0 in 1945 (but rose to 6.8 and 9.0 in the next two years). The incidence of typhus as a percentage of other common infectious diseases rose from an average of about 4 between 1935 and 1942 to about 14 between 1943 and 1946.

H. J. O'D. Burke-G. *Nov.*

FERRO-LUZZI G. Studio sulle malattie del gruppo del dermatite in Eritrea. (*Studies of the Fevers of the Typhus Group in Eritrea.*) *Boll. Soc. Ital. di Med. e Ig. Trop. (Ser. Eritrea)* 1948, v. 8, No. 3, 4, 110-45 9 figs. (7 on 4 pls.) (57 refs.) English summary.

The author gives an interesting summary of the numerous observations made by various Italian workers on the fevers of the typhus group in Eritrea. During the 10-year period 1927-1936, the total number of cases treated at the Asmara Hospital was 37 of which 28 were in Europeans. In 1937 the number of European patients admitted suddenly rose to 35 and in 1938, 24 European and 23 African patients were admitted.

The progress of the epidemic from 1939 onward can be judged from the following figures of admissions of African patients: the fatality rates for all patients for each year are given in brackets.

In 1939 there were 152 cases (14.8%). In 1940 66 (9.8%) and in 1941 320 (14.8%). The admissions rapidly fell to 39 (2.7%) in 1943 and again rose to 1,084 (11.6%) in 1946. The figure for 1947 was 335 (5.1%).

In the years of high prevalence the disease was predominantly of the epidemic type but murine typhus was in evidence throughout the period. Tick-borne typhus was relatively negligible in incidence: the author is inclined to regard all the cases as having been of the *hondanense* type though he states that other workers believe that some of them were of the tick-bite fever type. He describes the chief features of the tick-borne fever as including the occurrence of a tick fever and a papulo-nodular rash which is rare, haemorrhagic and

which extends to the palms, soles and face, the Weil-Felix reaction is inconstant or delayed, and the titres of agglutination of *Pr OX19* or *Pr OX2* are low

In the section dealing with treatment, the author repeats his claim that aspirin in daily quantities of 6-8 gm, continued till defervescence, has caused a fall in fatalities from 14.8 per cent to 1.0 per cent. In a footnote he takes strong exception to the suggestion by the present reviewer that his methods of control may not have been satisfactory and renews his assertion that when cases were selected the more severe were chosen for the trials of the drug [See this *Bulletin*, 1948, v 45, 249]. [One of the present reviewer's comments can now be withdrawn, this was "it also appears that the same group of patients formed the controls for tests of aspirin and three other drugs" This was based on the fact that exactly the same fatality rate was given for the controls of all the four drugs, but it is now explained that really there were four sets of controls and that the fatality rates were so uniform that an average figure was adopted for convenience. The other comments still seem to the reviewer to have been justified by the facts as stated, they were not intended to throw doubts on the good faith of the author and in any case they are now rendered obsolete by the further evidence supplied in the present paper, which follows]

In a further set of trials of aspirin between January 1st and June 30th, 1947, the fatality rate among 74 treated patients was 5.4 per cent and among 112 controls it was 10.7 per cent. These figures are in striking contrast to those given for the earlier trials in which the corresponding fatality rates were 1.0 per cent and 14.8 per cent. In the second half of 1947, the fatality rate among 221 treated patients was only 2.26 per cent, there were no controls. It would seem reasonable to suggest that there may have been a decline in the severity of the disease during the second half of 1947.

The author makes the interesting suggestion that the action of aspirin may be associated with the benzoic radical which is, perhaps, related to that of para-aminobenzoic acid

John W D Megaw

DREGUSS, M & FARKAS, E. Complement-Fixation Test for Serological Studies in Typhus Fever. *Arch f d Gesamte Virusforschung* Vienna 1948, June 30, v 4, No 1, 47-54 [12 refs]

This paper describes work carried out in 1944 when the authors had no access to the reports of similar investigations carried out by BENGTON, TOPPING, FULTON, and other workers.

Among 36 sera of healthy or syphilitic persons there was no case of a positive reaction with the complement-fixation or Weil-Felix tests.

Among 110 sera of patients believed or suspected to have attacks of typhus or typhoid fever there was a general agreement between the results of the two tests, but 13 sera were negative with the Weil-Felix test and positive with the complement-fixation test at titres of 1-16 or over, in 8 of these cases, later examinations were made and high-titre Weil-Felix reactions were observed.

In 4 cases there was a positive Weil-Felix reaction and an absence of complement-fixing antibodies, in these the former reaction "seems to be unspecific", the final diagnosis in two was typhoid fever, in the other two there was no change in the Weil-Felix titres of later samples.

From the results of a number of tests, including those carried out repeatedly on eight patients, the authors conclude that the complement-fixation reaction becomes positive about two days earlier than the Weil-Felix reaction [they seem to have regarded fixation titres of 1-16 as positive and Weil-Felix titres below 1-100 as negative]

In a group of 10 persons the rise in titre resulting from vaccination was more pronounced with the fixation test than with the Weil-Felix test in 2, but two cases.

John W. D. Meigs

DREIGUS, M. & FARKAS E. Estimation of the Antigenic Value of Typhus Vaccines by Complement-Fixation Tests. *Arch. f. d. Gesamte Bakt. u. Infektionskrankh.* Vienna. 1943, June 30 v 4 No. 1 85-82.

This paper like the preceding one was greatly delayed in publication. The studies described were carried out in 1944-45.

The complement-fixation test as performed by the authors was found reliable as a means of estimating the immunising value of typhus vaccines.

Among 13 vaccines of various kinds and from different sources only 3 were found satisfactory. Three of these were of the yolk-sac type: one was a mouse-lung vaccine and the fifth was a Weigl house vaccine. One of the yolk-sac vaccines and the Weigl vaccine were prepared in Hungary; the other two yolk-sac vaccines were of American origin and were the only samples obtained from that source.

Among the eight unsatisfactory vaccines five were of the yolk-sac type; the other three were prepared from chick embryos, mouse lungs and rabbit lungs, respectively. Three out of the four vaccines originating from state-controlled institutions in European countries other than Hungary were unsatisfactory; so also were all the three described as "manufactured and marketed in Europe." The age and conditions of storage of most of the vaccines were unknown.

John W. D. Meigs

ZIA S. H. & CHANG N. C. Studies of Typhus Fever in Peiping by the Complement Fixation Test. *Proc. Soc. Exper. Biol. & Med.* 1943 Oct., v 69 No. 1 22-3.

Among 20 sera of patients suffering from typhus fever in Peiping only one gave a higher titre reaction with murine than with epidemic antigen in complement fixation tests; five gave equal titres with both antigens; 12 gave titres twice to four times higher with epidemic antigen and one reacted only with epidemic antigen at a titre of 1-640.

The interesting feature of these results is that the authors in previous studies had tended to regard the rickettsiae of human typhus in Peiping as being predominantly of the murine type. They now state that the results of the fixation tests suggest that the rickettsiae both in the autumn and spring, of the past two years were largely of the epidemic type. In their previous studies they had relied on biological tests. [See, for example, this Bulletin 1942, v 39 143, 144 and 615.]

John W. D. Meigs

WESTERN AUSTRALIA. Report of the Commissioner of Public Health for the Year 1947 (Cook C. E. 68 pp., 1 chart. 1948. Perth W. H. Wyatt Govt. Printer).

This report contains two points of special interest to readers of the Bulletin. Firstly, 141 cases of murine typhus were reported during the year: 52 occurred in the Health area of the Perth Municipality; 70 in other Metropolitan areas and 19 from other parts of the State.

It is noted that 7 per cent. occurred in persons under 15 years; 73 per cent. between 15 and 49 and 20 per cent. in those of 50 years or over. The preponderance of cases during working ages suggests that the place of employment, rather than the home is the usual source of infection. The aetiology of the

disease takes on a special importance owing to the frequency of claims being submitted by patients under the Workmen's Compensation Act. It is noted that during the year discussions took place regarding the planning of an epidemiological research into murine typhus in Western Australia, with a view to approaching appropriate bodies for a grant.

During the year, 133 specimens of serum were positive to the Weil-Felix reaction (*Proteus* X19) in a titre of 1/100 or over, as compared with 68, 86 and 100 in the previous three years. Monthly incidence of these results is shown in a table. Broadly speaking, incidence rose from February to April.

The second point relates to leprosy. It is noted that in 2,210 films from 615 patients, there were 555 which showed acid-fast bacilli.

In 1946, 441 smears were positive out of 1,947 and in 1939, all of 5 smears were negative.

H J O'D Burke-Gaffney

RICKARD, E R Complement Fixation in Human Sera following Murine Typhus
Proc Soc Exper Biol & Med 1948, Oct, v 69, No 1, 31-4

The author carried out careful complement-fixation tests on the sera of 404 persons known or suspected of having suffered from murine typhus fever in Florida. In one group of 203 persons the diagnosis was regarded as highly probable and positive reactions occurred in about 86 per cent of the sera. In the other group, of 201 persons, the diagnosis was less probable and the reactions were positive in about 64 per cent. Taking account only of the positive reactions, the average titre in each group was almost the same, 1-21 and 1-22, respectively.

The average titre in a group of 67 persons who had been attacked 12 to 23 months previously was 1-30, in a group of 123 attacked 24 to 35 months previously it was 1-18, and in a group of 94 attacked 36 to 47 months previously it was also 1-18. It appeared, therefore, that there was little tendency to diminution of the titre after two years.

A group of 20 inmates of a New York correctional Institution served as a control, there were only three positive reactions and all these were at a titre of 1-2.

John W D Megaw

HILL, C L & MORLAN, H B Evaluation of County-Wide DDT Dusting Operations in Murine Typhus Control. *Pub Health Rep* Wash 1948, Dec 17, v 63, No 51, 1635-53, 8 figs [10 refs]

The authors describe a large-scale experiment planned for the purpose of finding whether murine typhus could be controlled by dusting rat runs and hiding places with 10 per cent DDT powder.

Three well-defined rural areas in South-West Georgia were selected in two of the areas, with populations of about 20,000 and 10,000 respectively, organized dusting operations were carried out on five occasions between April 1st 1946 and September 30th 1947. The third area was kept as a control. The numbers of cases of murine typhus in the dusted rural areas in each of the years 1945, 1946, and 1947, were 86, 31, and 6, respectively. The corresponding numbers in the control area were 31, 37, and 26. Equally significant reductions were observed in the dusted areas with regard to the percentage of rats showing positive complement-fixation reactions against murine rickettsial antigens, and the degree of infestation of the rats with *Xenopsylla cheopis* and *Leptopsylla segnis*.

There was only a slight degree of reduction in the rate of rat infestation by *Leponyssus bacoti* and *Polyplax spinulosa*.

Full details of the experiment are given in the paper which is likely to become a classic on the subject of the control of infection transmitted from rat to man by fleas.

It appears that the heavy dustings employed caused some deaths among the rats and also gave rise at first to mass exodus of the rats from the dusted localities.

John D. Meyer

LE GAC P. Nouveaux cas de fièvre exanthématique au Togo [Two Further Cases of Typhus Fever in Togo.] *Bull Soc Path Exot* 1942 v 41 Nos. 9/10 604-13 1 chart. [10 refs.]

One of these two cases of typhus-group fever is of special interest in being a striking example of the perplexities that arise in connection with the interpretation of serological findings—these were as follows—

Day of Illness	Weil-Felix titres			Rickettsia-Agglutination titre	
	Pr OX19	Pr OX2	Pr OXA	Epidemic	Murine
18	100	500	50	40	0
22	100	100	200		
27	50	0	50		
31				100	200
35	50	50	50		
43	200	200	100	100	200
52				40	100
				40	0

Complement-fixation tests carried out on an unstated day were positive at a titre of 12-6 with epidemic antigen and negative with murine and tick-bite fever antigens.

Guinea-pig inoculations were carried through 32 passages—the febrile reaction lasted 10-14 days—there was no acrotal reaction—70 per cent. of the animals died and the autopsy findings are said to have resembled those described by some workers as occurring in scrub typhus—no mention is made of the microscopic characters of the exudate.

The author states that the findings are rather disturbing (*prejudicables*) and that they tend to strengthen his formerly expressed opinion that the typhus of the African "savannahs" is nearly related to scrub typhus.

The rash was maculo-papular—a few macules were seen on the hand—there was no eschar.

There is no mention of the epidemiological conditions in which the infection was contracted.

John D. Meyer

BAILEY C. A. DIERCKX, F. H. & PROFFITT J. E. Preparation of a Serological Antigen and a Vaccine for Experimental *Tytrugamshi* Disease (Scrub Typhus). *J Immunology* 1943 Nov. 60 No. 3 431-41 9 figs. 15 refs.]

The authors give full detail of a method by which they have succeeded in preparing potent suspensions of *Rickettsia tytrugamshi*. The process involves repeated differential centrifugation of homogenized yolk-sac cultures diluted in casein hydrolysate solutions.

Three strains of the organism were used and all of them yielded suspensions which showed a high degree of activity in fixing complement and in immunizing

guineapigs Among the six strains of antisera used in the tests antigenic differences similar to those described by other workers were found to exist, but there was evidence of the presence of a common antigen, variable in amount, in all the strains

Further work to detect the degree of protection afforded to vaccinated animals against heterologous strains is being carried out and will be described in a later paper

John W D Megaw

DE MAGALHÃES, O & ROCHA, A Contribuição para o conhecimento do tifo exantemático neotrópico no Brasil [A Contribution to the Knowledge of Neotropical Exanthematic Typhus in Brazil] *Mem Inst Oswaldo Cruz* 1947, Dec, v 45, No 4, 825-45, 12 graphs English summary (7 lines)

In their study of neotropical typhus [tick-borne typhus of the Rocky Mountain spotted fever type] in Brazil the authors were struck by the pronounced tendency of infection to occur in small widely separated patches, and they suspected that this distribution might be due to the presence of infection in animals capable of long-range travel such as goats and deer A goat, a kid and a deer (*Cervus axis*) were found susceptible to intraperitoneal inoculation with the infection so that they were regarded as potential natural reservoirs of the disease

Weil-Felix tests were carried out on these and other infected animals, including a rhesus monkey, two coatis (*Nasua narica*), two wild cats, a rabbit, and a ferret, also in a number of uninoculated kids from various areas in Brazil and on three dogs Nine different strains of proteus were used in the tests—an H and an O strain of *Proteus* X19, *Pr* X2, *Pr* XL and *Pr* XK, and a strain of *Pr vulgaris*

The results of the tests are shown in graphs, from these it appears that the responses were of many different types, and the authors state that they have found the same strain of infection to give rise to a great variety of responses in different animals of the same species

John W D Megaw

TAYLOR, D J, MULRENNAN, J A & THURMAN, D C, Jr Species of Ticks associated with Rocky Mountain Spotted Fever Cases in Florida *J Econom Entom* 1948, Oct, v 41, No 5, 809-11

' On the basis of circumstantial evidence presented, *Dermacentor variabilis* appears to be the most likely vector of spotted fever in Florida The occurrence of *Amblyomma americanum* at the scene of one of these cases is not to be overlooked in view of recent discoveries "

RODRIGUES, P M & TRAVASSOS, J A reação de Bengtson no diagnóstico da febre maculosa das montanhas rochosas [Bengtson's Reaction in the Diagnosis of Rocky Mountain Spotted Fever] *Hospital* Rio de Janeiro 1948, July, v 34, No 1, 55-69, 1 graph English summary [22 refs]

Complement-fixation tests carried out by Bengtson's method were employed in the diagnosis of 10 cases of tick-borne typhus in San Paulo The test was found to be strictly specific in every case and the results obtained with antigens of local origin were identical with those obtained with an antigen supplied from the Rocky Mountain Laboratory, Montana These results furnished additional evidence of the identity of the spotted fevers of the Rocky Mountains and of San Paulo

Five of the cases were fatal, in four of these, sera were examined on the 5th to the 9th day and all were positive, whereas only one was positive with the

Well-Felix test. Sera of six patients giving titres ranging from 1-8 to 1-16 with the homologous antigen were completely negative with antigens prepared from epidemic and murine strains of rickettsiae. *John W. D. Meigs*

FRASER, L. E., ROSENFELT, H. & DANCIGER, J. A. Para-Aminobenzoic Acid in Treatment of Rocky Mountain Spotted Fever. *Amer. J. Dis. Child.* 1948 Apr., v 75 No 4 493-504 1 chart. [Ref. in footnotes.]

Details are given of four cases of Rocky Mountain spotted fever in children who were treated with para-aminobenzoic acid. In three of the cases, treatment was started on the 8th or 9th day and rapid improvement was observed. In the fourth case the first dose was given on the 13th day, but death followed seven days later. This child, aged seven years, received altogether 144 gm. of the drug and an excessive blood level of 282 mgm. was reached at one stage accompanied by extreme acidosis.

The authors do not agree with the observers who claim that the drug, is of low toxicity. They mention in a foot note that some manufacturers are now producing a sodium salt of the drug which does not appear to cause acidosis.

John W. D. Meigs

HARRELL, G. T., MEADS, M. & STEVENS, A. "Aureomycin," a New Orally Effective Antibiotic. Clinical Trial in Rocky Mountain Spotted Fever. Results of Susceptibility Tests and Blood Assays using a Turbidimetric Method. *Southern Med. J.* 1949 Jan., v 42, No. 1 4-12, 4 figs.

In the three cases described, aureomycin appears to have had a strikingly curative action similar to that observed in the larger series of cases reported in the following paper.

The total daily oral dosage was 3.0 to 6.0 gm. given in divided doses every four to six hours.

It is mentioned that the drug rapidly loses its activity when kept in solution, even for a few hours.

John W. D. Meigs

ROSS, S., SCHROENBACH, E. B., BURKE, F. G., BRYAN, M. S., RICE, E. L. & WASHINGTON, J. A. Aureomycin Therapy of Rocky Mountain Spotted Fever. *J. Amer. Med. Ass.* 1948 Dec. 25 v 138, No. 17 1713-18 1 chart. [Refs. in footnotes.]

This paper opens with a brief summary of what is known with regard to aureomycin, a new antibiotic derived from a strain of *Streptomyces aureofaciens* which gives rise to a golden colour in culture media.

The drug was found to protect mice and guinea-pigs against harmful results from inoculation with the rickettsiae of Q fever, rickettsialpox, Rocky Mountain spotted fever and murine typhus. The drug is readily absorbed when given by the mouth and is of low toxicity except when administered intravenously. Doses up to 60 mgm. per kgm. daily for 48 hours cause no toxic effects except occasional nausea and vomiting after the first few doses. References are given to five papers presented at a conference on Aureomycin held under the auspices of the New York Academy of Science on July 1st 1948.

In the present study, 13 patients with Rocky Mountain spotted fever were treated. The ages of the patients ranged from 18 months to 50 years.

The results are described in detail. They are remarkably good, and appear to resemble closely those described by SMADEN *et al.* as occurring in cases of scrub typhus treated by chloromycetin (*this Bulletin* 1949 v 46 27).

The average duration of the fever after the first dose was two-and-one-third days and even in the two patients whose treatment started on the 7th day

of the illness the response was equally satisfactory, whereas in a previous series of cases treated with *para*-aminobenzoic acid no benefit was observed among patients whose treatment started after the 7th day

The dosage adopted was three initial doses of 2-5 mgm per kgm, per os at intervals of one hour, then the same doses every two hours till the temperature had remained normal for two days, then the same doses every four hours. The duration of treatment ranged from four-and-a-half days to nine days, the average total amount of the drug was 9.5 gm, the range being 2.3 to 16.3 gm

In all the cases that came under treatment before the 7th day there was a striking absence of symptoms pointing to the need for supportive treatment

No mention is made of the availability or cost of the drug

John W D Megaw

ORTIZ MARIOTTE, C & CALDERÓN, C Hexaclorociclohexano, su efecto en la garrapata comun del perro en México. Prueba de laboratorio—Informe preliminar [The Effects of Hexachlorocyclohexane on Dog Ticks in Mexico] *Boletín Oficina Sanitaria Panamericana* 1948, Aug, v 27, No 8, 719-23 English summary

The commonest dog tick in Mexico is *Rhipicephalus sanguineus*, which abounds in the northern States, where it is considered to be an important vector of Rocky Mountain spotted fever [this *Bulletin*, 1946, v 43, 1134, 1948, v 45, 165, 252]. The authors describe a number of experiments indicating the lethality of gammexane to ticks. The advantages of this substance and its comparative absence of toxicity to domestic stock suggest that it may enable the control of "spotted fever" to be achieved. Satisfactory results were obtained with DDT in La Laguna in 1947, and the authors suggest that comparative studies be made in areas of Mexico where *R. sanguineus* is prevalent, to ascertain the relative practical and economic values of DDT and gammexane in controlling this vector of the disease

H J O'D Burke-Gaffney

HENI, E & GERMER, W D Q(ueensland)-Fieber in Deutschland [Q(ueensland) Fever in Germany] *Deut med Woch* 1948, Oct 15, v 73, Nos 39/40, 472-6, 5 figs

In September 1947, the author began to observe the occurrence, in villages near Tübingen, of an influenza-like illness in which a considerable number of the patients had symptoms of atypical pneumonia

A detailed study was made of an outbreak of the disease at Remmingsheim, a compact farming community of about 700 persons. The first cases occurred at the end of November, and no less than 260 persons were attacked during the month of December. By the beginning of February 1948, the outbreak came to an end. The total number of cases was 326

The first serological tests were carried out in January, among 21 sera 19 gave positive complement-fixation reactions against Q fever antigen, at titres ranging from 1-32 to 1-1,024. At a later stage 13 other cases were confirmed by complement-fixation tests of patients' sera or of inoculated guinea-pigs. The 32 proved cases belonged to 28 families of whose members 100 were attacked

A detailed clinical description of the disease is given, the only special feature was that altogether seven patients died. Two of the deaths were due to pulmonary embolism, one to a metastatic empyema following gangrene of both feet, the remaining four fatalities occurred in old men who developed hypostatic pneumonia after mild attacks. Radiographic evidence of lung involvement

was found in 23 per cent. of the cases. The severity of the attacks was extremely variable—ambulatory or very mild cases occurred more frequently among women and children than among men.

A brief description is given of outbreaks in three other villages near Tabriz during 1948. In one village of 2 450 inhabitants there were about 300 cases; in another with a population of 4 000 it was estimated that 30 per cent. of the people were attacked.

Most, but not all, of the patients had been associated with cattle. Inhalation of dust derived from dried faeces of infected ticks, the drinking of infected milk, and man-to-man infection by inhalation of infected droplets, are possible modes of transmission. The last-mentioned method would best account for the explosive nature of the outbreaks and the spread of infection through whole families, starting from a single infected person.

Some confusion resulted from the simultaneous occurrence of another short fever in which also atypical pneumonia often occurred: this appears to have been a true virus infection; the catarrhal symptoms were more pronounced, and attacks in infants were much more common than was the case with Q fever. The only reliable method of diagnosis was the complement-fixation test.

John W. D. Meigs

PAYZIN S. Orta anadolu da bir köyde Q humması salgını. [Q Fever Epidemic in Oranek Village.] *Türk İhtisas ve Tıbbi Biyoloji Dergisi* Ankara 1948 v. 8, No. 3 116-23. English summary 124-5.

— Faz Ankara, İzmir çıkışlı Q humması suşları ile bağışıklık deneyleri. [Cross Immunity Experiments with Original Maras, Ankara, İzmir Q Fever Strains.] *Ibid.* 126-9. English summary 130-31.

The epidemic described occurred in a village of Anatolia: there were 20 cases in one of which there was a typhus-like rash.

Rickettsia burnetii was isolated by guinea-pig inoculation: one strain was isolated and identified by R. R. PARKER from a tick (*Ornithodoros lakwani*) which had fed on an infected guinea-pig.

Infection was suspected of having been transmitted by the inhalation of infected dust from wool kept in the hives of the patients. Apart from this outbreak it is stated that many strains of *R. burnetii* have been isolated from patients in many parts of Turkey where the disease is endemic. Guinea-pigs convalescent from experimental attacks were found immune to a Morocco strain, to two Smyrna strains, and to an Ankara strain.

John W. D. Meigs

BROWN D. C., KNIGHT L. A. & JELLINEK W. L. A Fatal Case of Q Fever in Southern California. Reprinted from *California Med.* 1948 Sept. v. 68 No. 3 2 pp.

"The first confirmed fatal case of Q fever in Los Angeles County is reported. The patient's occupation brought him in frequent contact with livestock (is characteristic of about 72 per cent. of the cases so far studied in Southern California). The clinical course was typical of the disease. The patient was the first under 50 years of age known to have died of Q fever. The clinical history and the gross and microscopic pathological findings were consistent with those of a previous fatal case in America. The diagnosis was confirmed by the isolation of *C. burnetii* in experimental animals injected with blood and internal marrow collected at postmortem examination.

JELLISON, W. L., ORMSBEE, R., BECK, M. D., HUEBNER, R. J., PARKER, R. R. & BELL, E. J. *Q Fever Studies in Southern California V Natural Infection in a Dairy Cow* *Pub Health Rep Wash* 1948, Dec 10, v 63 No 50, 1611-18

A detailed examination was carried out on the carcase of a dairy cow slaughtered while excreting rickettsiae of Q fever in her milk, and while positive at a titre of 1-32 with the complement-fixation test against Q-fever antigen. There was evidence that infection had been present for at least two months. The cow was in the fifth month of pregnancy.

Full details are given of the gross and microscopic changes detected in the various tissues, but the authors conclude that none of these changes can with certainty be attributed to infection with Q fever.

The changes include a subacute and chronic focal mastitis and a slight degree of focal cellular infiltration of the kidneys, lungs, and pituitary body.

An extensive series of inoculation tests were carried out on guinea-pigs, suspensions were made of all the important organs of the body, the only ones found definitely infected were eight made from different parts of the udder and one from a supramammary lymph node. One out of four guinea-pigs inoculated with lung suspension became infected, but a further test, in which eight guinea-pigs were inoculated with other lung suspensions, gave negative results. Milk from each of the four quarters of the udder was infected. Blood and other fluids of the cow and the unborn calf gave negative results.

The evidence of infection in the experimental guinea-pigs was the appearance in their sera of complement-fixing antibodies against Q-fever antigens.

John W. D. Megaw

LACKMAN, D. & PARKER, R. R. *The Serological Characterization of North Queensland Tick Typhus* *Pub Health Rep Wash* 1948, Dec 10, v 63, No 50 1624-8

In the present study 30 rabbits were inoculated intraperitoneally with a strain of rickettsia originally isolated from a case of North Queensland tick typhus and maintained since 1945 in guinea-pigs.

Serological tests were carried out on the rabbits at intervals of 14, 16, and 27 days. In each test the sera of 24 rabbits were examined.

No significant agglutination was obtained with suspensions of *Proteus* OX19, Pr OX2, Pr OXK, or Pr XL.

With complement-fixation tests, all the 24 sera gave negative reactions with antigens of Q fever, epidemic typhus and murine typhus. With antigens of Rocky Mountain spotted fever, 22 of the sera were positive, with bouton-neuse fever antigen, 12 were positive, and with North Queensland tick typhus antigen, 13 were positive.

These results were regarded as indicating that North Queensland tick typhus belonged to "the spotted fever group of rickettsiae." The findings are in conflict with those of Plotz *et al* who reported that the reactions against Rocky Mountain and bouton-neuse fever were negative [See this *Bulletin*, 1947, v 44, 204].

Ten of the above rabbits were later challenged with epidemic-typhus infection, and all responded by giving positive Weil-Felix reactions and positive complement-fixation reactions against epidemic typhus antigens. Four other rabbits of the group were challenged with Rocky Mountain spotted fever infection, three of them developed positive Weil-Felix reactions, and all four gave positive fixation reactions against the homologous antigen. Five of the rabbits were challenged with bouton-neuse infection, none gave a positive Weil-Felix reaction, but all gave fixation reactions against bouton-neuse antigen.

The antigenic relationships of the rickettsiae were further studied by carrying out complement-fixation tests on guinea-pigs immunized against various kinds of rickettsiae with the use of antigens prepared from yolk-sac cultures of L. North Queensland tick typhus, by the method described by TORRIS and SHEPARD [this Bulletin = 1948, v. 43, 810]. The table shows the results obtained with "soluble" antigens and rickettsial suspensions; the titres observed when homologous antigens were used are shown for comparison.

Titres / Complement-Fixation Tests of Immune Guinea-Pig Sera. Averages of 20 Tests

Antibers against	Antigen		Homologous Rickettsial Suspension
	Soluble Antigen	Rickettsial Suspension	
N. Q. Tick Typhus	248	128	128
S. African Tick Bite Fever	88	3	64
Boutonneuse Fever	43	10	320
Rocky Mountain Spotted Fever	100	13	40
Rickettsialpox	200	13	160
Maculatum Disease	64	0	328
Murine Typhus	0	0	512
Q Fever (American)	0	0	416

The authors' conclusions are that the disease belongs to the spotted fever group of rickettsial diseases, but that the strain of rickettsia is not "synonymous" with any of the known members of the group.

John H. D. Mc. Jr.

BARTONELLOSIS

MACCHIARELLI A. Posible nuevo tratamiento para la bartonellosis americana. Auto-hemoterapia intradérmica. Mecanismo bio-patológico de la infección bartonellar. [Possible New Treatment of Bartonellosis. Intradermal Auto-hemotherapy.] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil 1944 Dec. v. 1 No. 4 341-61 1 folding chart

None of the methods of treatment of bartonellosis hitherto applied, liver extract, vitamins, salvarsan, compounds of arsenic and antimony blood transfusion, etc.—has given very good results. The author has tried what he calls "intradermal auto-haemo-vaccine therapy" and reports excellent results in 8 patients since December 1943—one a boy of 15 years the others adults. In another though the *Bartonella* disappeared from the blood in 6 days, death occurred 4 days later.

The following is the method adopted: 10 cc. of blood are taken into citrate from a vein at the elbow and set aside for 6 hours; then, from the deposit (avoiding the upper layer of leucocytes) is withdrawn by a syringe the amount of blood it is desired to inject—2-3 cc. intradermally and the rest intramuscularly. In a case reported in detail, after 4 weeks of general treatment with vitamins B₁ and C and liver extract, on the 31st day of disease the first injection was given; the second on the 35th, by which time *Bartonella* were fewer; fever still on the 40th when a third injection was given; none were seen when later injections were given on the 46th, 55th, 62nd and 68th days of disease. In one patient the *Bartonella* organisms were not seen after 3 da

in others in 4 days (two cases), 6 and 16 days Vitamin administration consisted of 200-600 mgm of vitamin C (Ascorbicin Squibb) daily intravenously, with 1 cc of Parentosol, but the impression was that these played no specific part in the cure, they merely improved the general condition This treatment seemed to forestall the verrucose, eruptive stage, at all events none of the patients so treated developed verruga

The essential difference between this method and that of autohaemotherapy previously applied consists in the fact of *intradermal injection*, whereas others used the subcutaneous or intramuscular route—on this the author lays great stress
H Harold Scott

YELLOW FEVER

HALAWANI A, ABDEL AZIZ, A & ASHOUR, M A Report presented to H E the Minister of Public Health by the Yellow Fever Mission to Nigeria (West Africa)
J Roy Egyptian Med Ass 1944 Aug, v 27, No 8, 341-90, 4 figs & 2 maps
[29 refs] [Recd 13 Dec, 1948]

PAOLIELLO, A Contrôle da febre amarela e de outras doenças transmitidas por mosquito [Control of Yellow Fever and other Mosquito-borne Diseases]
Bol Oficina Sanitaria Panamericana 1948, Nov, v 27, No 11, 1005-44, 2 maps [89 refs] English summary

This is a summary of some methods of control of the mosquito-borne diseases, yellow fever, malaria, filariasis and dengue. The great part of the article deals with the use of DDT against mosquitoes and of virus as a prophylactic against yellow fever and the use of the viscerotome in diagnosis

DDT is an efficient insecticide, but it has its limitations House-spraying, for example, will not eliminate *Aedes aegypti* whose eggs are viable for a period longer than the spray is effectual It must also be used as a larvicide in domestic water-containers There is need also to search for obscure or hidden foci and destruction of adult insects DDT must be used also in vessels sailing to and from mosquito-infected ports In the prophylaxis of yellow fever, the virus 17D vaccine, long in use, is compared with a neurotropic French strain, it is shown that the former is not easy to preserve and the conclusion is reached that the French strain is better

Viscerotomy specimens of liver obtained from males between 10 and 50 years of age who die in less than 11 days from the onset of a fever will reveal all that is necessary as regards silent areas of jungle yellow fever Studies in Colombia showed that of 352 cases of yellow fever discovered by viscerotomy, 92 per cent were males and 81 per cent were persons between 10 and 50 years of age

Anti *aegypti* measures will be effective against dengue as against yellow fever

In malaria control, DDT is still the basic element, with drug treatment secondary DDT has also done much to solve the problem of filariasis control but a good second is Hetrazan (methyl diethyl-carbamyl piperazine hydrochloride) in attacking the filarial embryos
H Harold Scott

RABIES

REMLINGER & BAILEY. J. Sur les échecs du traitement antirabique. [On the Failure of Anti-Rabies Treatment.] *Bull Acad Nat Med* 1915 v 132, No 3376 398-9

After trauma or emotional disturbance rabies often makes an unexpected appearance in human beings as well as in lower animals some time after a full course of anti-rabies injections has been regularly administered. In explanation of such occurrence the authors advance an interesting hypothesis which in the article under review is considered along the lines summarized below.

When the rabies virus, now regarded as a nucleoprotein reaches a neurone, its action is to interfere with the anabolism of the cytoplasm. Inasmuch as the neurone itself elaborates the substance of the rabies virus which paralyzes it, such interference results in the continued production of new molecules of rabic nucleoprotein, which are conveyed via axis cylinders their prolongations and synapses to healthy neurones, wherein the process is repeated. The effect of this chain reaction is the rapid invasion of all the chief elements of the nervous system, and so rabies occurs.

Such however is not always the sequence of events. Neurones can in certain circumstances as yet imperfectly understood, defend themselves against attack by the virus. The mechanism of defence is that of all living cells against a foreign protein—a precipitation of the latter in an insoluble state *i.e.* flocculation. Under the influence of this defence reaction, therefore the molecules of rabies virus may on reaching the neurones pass from their ordinary colloidal state to a state of flocculation—the first step towards total destruction of the virus which both under natural and experimental conditions, frequently takes place. This phenomenon is termed by LEVADITI "neuro-infections à *infectivité*."

It follows, then that the rabic nucleoprotein once flocculated in the neurones, no longer provokes any cellular reaction the production of fresh virulent molecules is arrested and no disturbance of function ensues.

Flocculation is however a state of equilibrium, essentially unstable and reversible. If then, by any action mechanical, chemical or electrical this equilibrium is upset the state of flocculation passes immediately to one of dispersion, *i.e.* to the colloidal state. Resulting from this change of state the rabic molecules rapidly recover their original properties and, as soon as a sufficient number of neurones has been affected the disease abruptly manifests itself.

In the light of this new hypothesis, the effect of anti-rabies treatment may now be examined. Specific treatment consists in the inoculation of suspensions containing partially virulent or wholly avirulent rabic protein. After a sufficient number of injections, the body fluids acquire tonic properties, evidenced by the fact that the blood serum becomes capable of neutralizing the rabies virus *in vivo*. As soon as ever this stage is reached, the virulent molecules of rabic nucleoprotein, which have invaded the neurones flocculate and such flocculation, in the vast majority of cases is followed by a disappearance of the infective nucleoprotein.

In a minority of cases, however in consequence of undue excitation or inhibition of the neuro-vegetative system (*e.g.* fear anger shock) or in consequence of an upset in the acid base equilibrium of the blood and tissues (*e.g.* fatigue overwork, violent muscular effort) there may occur even after a full course of anti-rabies treatment a reversion on the part of the rabic molecules from

the state of flocculation to the colloidal state—a reversion which accounts for the unexpected onset of the disease and for certain failures of anti-rabies treatment
G Stuart

MACE, D L Five Unusual Cases of Canine Rabies *J Amer Vet Med Ass* 1949, Jan, v 114, No 862, 30-32

PLAGUE

HÉRIVAUX, A & TOUMANOFF, C Étude de la "faune pulcicienne domiciliaire" des rats au cours d'une épidémie de peste à Saigon, ses conséquences pratiques [Practical Significance of the Results of Studying the "Domestic Flea Index" in Rats during a Plague Epidemic in Saigon] *Bull Soc Path Exot* 1948, v 41, Nos 5/6, 318-25

From June, 1943, to May, 1944, the authors made regular collections of fleas from the floors of human habitations in Saigon. They considered that from such a flea survey they could obtain information of value in the study of plague transmission.

The fleas they were concerned with were those which had left the rats and were to be found in the dust on the floors of the houses. They record their monthly totals in three tables. One lists the numbers of fleas caught in huts with earth floors, the second those found in stone houses with tiled floors and the third table combines both sets of data. The number of premises is not given.

Of 6,820 fleas collected throughout the year, only 12 were *Pulex irritans*. *Ctenocephalides canis* and *C. felis* were most numerous (6,465) and fleas of the genus *Xenopsylla* (*cheopis* 200 and *astia* 133) less so, but these latter species were more common than *Ctenocephalides* in June and July, during a plague epidemic. *X. cheopis* is the main vector, though *X. astia* is also important, the former being more common than *X. astia* on the floors of the stone houses, while in the huts with beaten earth floors there were more *X. astia* than *X. cheopis*.

Figures are also given to show that numbers of these fleas contained human blood.

As a result of this survey, the authors are convinced that, in Saigon at least, a flea index, calculated from such a survey of fleas caught from among the floor dust of human dwellings, is of more value in assessing the risks of plague transmission than is the usually accepted "*cheopis* index". H S Leeson

FAVAREL, R Le rôle du pou de l'homme dans la transmission de la peste à Madagascar [The Role of the Human Louse in the Transmission of Plague in Madagascar] *Bull Soc Path Exot* 1948, v 41, Nos 9/10, 576-80

The author was unable to find evidence of a significant difference between the virulence of a culture of plague bacilli obtained from the bodies of three lice, the dead body of a child who had died of plague, and of another culture obtained by spleen puncture of the child.

A study of the epidemiological conditions prevailing in Madagascar yielded no evidence to support the view that the human louse had played an appreciable rôle in the transmission of plague from man to man. John W D Megaw,

WAGLE P M & BEDARKAR M K. Pneumonic Plague and its Treatment. *Indian Med Gaz.* 1948 Sept., v 83 No. 9 406-8.

Six cases of pneumonic plague were treated by streptomycin given by the intramuscular route. The usual dosage was 0.66 gm. every four hours till clinical improvement was observed, when the dose was diminished. The total amount given ranged from 15.3 to 38.0 gm.

Five of the six patients recovered. The fatal case was one of secondary pneumonic plague and death occurred on the second day. Two of the patients who recovered had secondary pneumonic plague; the other three had primary attacks. Three of the cured patients received antiplague serum, the usual dose was 40 cc. twice daily. The other two patients who recovered were also given serum and in addition they received sulphamerazine 7.0 to 9.0 gm. in divided doses on the first day then 3.0 to 4.0 gm. daily.

The authors attribute the recovery of the five patients to streptomycin but they advise the use of serum in addition with or without sulphamerazine. It is stated that primary plague pneumonia is often of the lobar type sometimes with "stringy" sputum, sometimes with little or no sputum. Leucopenia is usual in the early stage blood cultures are negative. *John H. D. Meyer*

CHEN T H. A Preliminary Report of Rat-Poison with Red Squill, "1090" and ANTU. *Chinese Med J Shanghai*. 1948 July v 63 No. 7 384-6.

1. Red squill, when used in a concentration of 10 per cent. as bait containing animal fat gave results comparing favorably with those obtained with barium carbonate.

2. 1090 proved, as in the United States so also in China, a most efficient rat poison, but it must be handled and used by specially trained workers only.

3. ANTU was found in Foochow to be almost as effective against *R. rattus* as against *R. norvegicus*. Prospects for utilizing it for universal rat poisoning campaigns in China are therefore good and since ANTU acts in contact its application could be rendered fairly safe.

CHOLERA

OMAR, W & VASSILIADIS P C. Study of the Vibrios Isolated at El-Yor Quarantine Camp during the Pilgrimages of 1941-42 and 1942-43. *J Roy Egyptian Med Ass* 1943, Oct. v 26 No 10 348-54.
[Recd. 13 Dec. 1943.]

1. During the pilgrimage of 1941-42, vibrios were found in "28 per cent of the stools examined, while in only 0.56 per cent were they found in the 1942-43 pilgrimage. As during this last pilgrimage, there were no Indian pilgrims at the Hedjaz, this might probably explain the smaller percentage of vibrios found in this year.

2. Agglutinins were found, in the sera of carriers of non-agglutinable vibrios against some of these vibrios especially against one particular vibrio (*A. N. 27*) which was agglutinated by its carrier serum in 1/800. It is assumed that these agglutinins represent normal antibodies.

3. Some characters of the non-agglutinable vibrios isolated from the 1941-42 and 1942-43 pilgrimages are described. It is of interest to note that while in both groups the majority of these vibrios belonged to fermentation

group I of Heiberg, all the other vibrios of the first year belonged to group V, whilst all the rest of the second pilgrimage belonged to group III except one that belonged to group II "

FELSENFELD, O Antigenic Relationship of *Salmonellae* to Inaba Strains of *Vibrio comma* isolated in Egypt *Proc Soc Exper Biol & Med* 1948, Oct, v 69, No 1, 95-6

GOHAR and MAKKAWI found that strains of the cholera vibrio from the recent outbreak in Egypt were agglutinated by *Salmi enteritidis* sera [this *Bulletin*, 1948, v 45, 706] The present author tested 3 strains of the vibrio (Inaba type) obtained from the Egyptian epidemic against 25 O, 2 V₁ and 39H *Salmonella* sera Live antigens were used and the preparation of antisera and the technique of agglutination and absorption tests were carried out according to standard methods, which are quoted

The results are shown in detail in three tables, which show that agglutination occurred with dilutions of various *Salmonella* sera as high as 5 to 25 per cent of their titre against the homologous *Salmonella* when the serum contained agglutinins for the *Salmonella* antigenic factors I, XII or g Absorption tests confirmed that parts of these three antigens were present in the strains of cholera vibrio Sera prepared against the latter also agglutinated *Salmonella* strains containing the three antigenic factors quoted The author therefore shows that the three Inaba strains ("K", "4" and "8") of the cholera vibrio isolated recently in Egypt harboured fractions of *Salmonella* I XII and g antigens
H J O'D Burke-Gaffney

TAO, S C, WOO, M O & LOH, W P Clinical Observations on 687 Cases of Cholera *Chinese Med J Shanghai* 1948, July, v 66, No 7, 377-84

The findings in 687 cases of cholera in Shanghai, in which the diagnosis was confirmed by the isolation of the vibrio, are examined and tabulated The majority of the patients were poorly educated labourers and vagabonds and their families Incidence was at all ages from 3 to 77 years and highest in the 21-30 age group There was a preponderance in males over females of 5.3 The disease occurred in 83 per cent of those whose inoculation history could be ascertained

The figures given for the percentage of cases showing different symptoms are in accordance with usual experience Uraemia was the most serious complication and occurred in 27 patients (3.9 per cent) of whom 8 died, giving a mortality rate of about 30 per cent

In discussing uraemia, developing after the acute stage with retention of non-protein nitrogen, it is considered that haemorrhages in the cortex and damage to the tubules result from the effect of prolonged or severe circulatory disturbance, restoration of efficient renal function being delayed or failing to occur even after dehydration and collapse have been corrected It was noted that many uraemic patients "developed generalised oedema of mild to moderate degree when slight excess of saline was pushed parenterally in an attempt to promote urinary excretion"

In uncomplicated cases the average duration of illness was 4 to 5 days and with uraemia 7 to 8 days Treatment was by intravenous transfusion of normal saline and with 0.5 per cent sodium bicarbonate in half-normal saline Glucose-saline was given in cases of relatively prolonged course or when there was uraemia and acidosis At a period when the saline solution used was known not to be pyrogen-free the majority of patients had febrile reactions after transfusion When pyrogen-free saline was used, mild or moderate fever occurred in only 31.5 per cent of cases

The case mortality rates experienced in India and China at periods when different methods of treatment were used are shown in a table for comparison. From a figure of 89 per cent (in Calcutta in 1895-1905) there has been a striking drop in the death rate following the introducing of treatment by saline transfusion and experience of the use of the method. In the present series of bacteriologically confirmed cases in Shanghai the rate was 4.7 per cent, and including cases diagnosed clinically the figure was 6.2 per cent. The highest mortality rate was in the age group 0-10 years (17.9 per cent.)

No statistical interpretation can be placed on the results of a short series of 41 cases treated with 1 gramme of sulphadiazine orally every 4 hours for 4 or 5 days along with an equal amount of sodium bicarbonate. A general impression was gained that the treatment reduced the severity and duration of the attack. The authors are highly sceptical of the likelihood of any striking effect being obtained by chemotherapeutic treatment in cholera in view of the nature of the disease in which the primary requirement is the replacement of fluid.

In a daily bacteriological examination of the stools of 218 cases, until two successive negative cultures were obtained, it was found that 80 per cent. were negative on or before the 6th day; none of the cases was positive beyond the 8th day.

J. Telle

SINGER, E., WEI S. H. & HOA, S. H. Cholera Immunisation. *J. Immunology* 1948, Oct., v. 60 No. 2, 181-7

The response to immunisation with cholera vaccine prepared in different ways was tested in human subjects. An Ogawa strain isolated in Nanking was used for the preparation of the vaccine, no penicillin of the growth on beef extract agar being first prepared by washing off with physiological saline solution. The suspensions were treated in the following ways:—

1. Heating at 55° to 56°C. for 30 minutes and preserving with 0.5 per cent. phenol.

2. Adding 0.3 per cent. formalin to kill the vibrios and preserving with 0.5 per cent. phenol.

3. Immersing the containers in boiling water and maintaining the temperature at 100°C. for 30 minutes, 0.5 per cent. phenol being subsequently added.

4. Adding absolute alcohol to a concentration of 75 per cent. and then diluting to the required vibrio content (8,000 million per ml.) with alcohol adjusted to 20 per cent.

[Vaccine of the type very commonly used, in which the only treatment employed is the addition of phenol, was not tested.]

The experimental subjects were given subcutaneous injections of 4,000 million, 4,000 million and 8,000 million organisms at intervals of 7 days. The reactions to inoculation were insignificant and did not vary appreciably with any of the types of vaccine used.

In a first series of subjects no significant difference was found in the agglutination titres of those given either the vaccine heated at 56°C. or the vaccine treated with formalin or alcohol. Vaccine heated at 100°C. appeared to give a better antibody response but in a second series in which the vaccines heated at 56°C. and 100°C. were compared this difference did not occur. A chance variation or some extraneous factor had been responsible for the first finding.

The effect of intracutaneous 100°C. was also tested. 0.1 ml. followed by 0.1 ml. significantly from that of

subcutaneous
injection
antibody

heated at 56°C. and
subcutaneous injections
that did not differ
route with

the larger doses. When three intracutaneous doses of 0.2 ml were employed the agglutination response obtained was higher than by any other method. In some instances, however, a small abscess formed about 4 to 6 days after the third injection. "Although these abscesses were quite insignificant and their formation was not accompanied by any marked discomfort they must be considered as an undesirable complication and, at present, a contraindication against the use of intracutaneous vaccination in cholera prophylaxis."

In a previous communication [this *Bulletin*, 1949, v 46, 37] the authors had described the effect of filtrates of cultures of *V. cholerae* in causing shedding of the epithelium of the ileum of the guinea pig and the neutralization of that effect by rabbit serum containing antibodies against the somatic antigen of the vibrio. The same effect was obtained with the sera of immunized human subjects during the course of this study. The neutralizing antibodies were removed by absorption with a boiled suspension of *V. cholerae*.

The antibodies produced by the vaccines prepared in different ways were shown to be identical by cross absorption tests. J Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

DE FIGUEIREDA, J. M. P. A carência alimentar e a parasitose intestinal (anquilostomíase e amebíase) no determinismo da úlcera duodenal (Contribuição para o estudo de patologia regional) [Avitaminosis and Intestinal Parasitism in the Aetiology of Duodenal Ulcer] *Bol. Geral de Ucd Nova Goa* 1947, Jan-Dec, Ser 29, Nos 1/12, 27-42.

The author puts forward the view, and gives notes of nine cases in support of his thesis, that food deficiencies associated with amoebiasis or ankylostomiasis have some aetiological connexion or play a part in the causation of duodenitis and duodenal ulcer. The author bases his statements on experience of several years' observation [but it is not clear, and it would be difficult to demonstrate, that the conditions are aetiological connected and not merely chance concomitants]. H Harold Scott

RICKARDS, A. G. On the Incidence of Protozoal and Bacillary Intestinal Infections in Men of the Royal Air Force returning from Service in Tropical and Subtropical Lands. *J. Trop. Med. & Hyg.* 1949, Jan, v 52, No 1, 2-11 [38 refs].

The purpose of this paper is to record the results of certain investigations undertaken in the examination of R.A.F. officers and men immediately prior to their demobilization. All were examined immediately after disembarkation from overseas. The subject is discussed under three main headings, namely: the post-clinical histories of diarrhoea and dysentery, the incidence of various protozoal organisms and their relationship to previous clinical history in a similar group, and the pathogenesis of *Entamoeba histolytica*. In the delineation of the geographical area two broad distinctions were made, namely Indian and Mediterranean theatres. The questionnaires from 22,200 men were examined, representing an unselected sample. For simplicity's sake, all cases of dysentery or severe diarrhoea that were not protozoal, were classified under the heading of "bacillary dysentery". The principal value of the figures obtained is to be found in their comparison rather than in their absolute totals. All faeces examinations were carried out by the author so accordingly the personal error has been kept more or less constant. In 2,000 cases, some 2,500

specimens were examined and all in which *E. histolytica* was suspected or diagnosed on the initial preparation were re-examined in a freshly-ripened specimen. It was possible to examine one specimen only and therefore an adjustment has to be made so that the true incidence is about three to five times that established by a single examination (see this *Bulletin* 1933, v 22, 220). Calculation in this fashion would give the true incidence of *E. histolytica* as follows:—

Mediterranean group 16.41 to 17.35 per cent.

India group 91.89 to 96.65 per cent.

and the incidence of non-pathogenic protozoa as

	India group	Mediterranean group
<i>Eutamias col</i>	15.1	18.1
<i>Endolimax nana</i>	10.00	7.5
<i>Iodamoeba bitumella</i>	3.8	3.05
<i>Giardia lamblia</i>	0	2.13

The incidence of amoebic dysentery was nearly seven times as high among those returning from the Indian area (1.78 per cent. against 0.28 per cent). On the results obtained from this survey it can be estimated that about half a million men might be expected to return from overseas harbouring *E. histolytica*. The incidence of *E. histolytica* has not been found to vary between two groups of men composed of those who had suffered from bacillary dysentery and those who had not. The variation in the incidence of the parasite is not significant between those giving a past history of dysentery and those who had been free from it but that of *E. histolytica* is significantly higher in those presenting a past history of amoebic dysentery. It is suggested that the strain of *E. histolytica* which affected men in the Indian theatre is of greater virulence than that endemic in the Mediterranean.

The clinical histories of 25 symptomless cyst-passers were followed up for periods of 6–10 months and showed that three of the men developed symptoms of gastro-intestinal dysfunction probably related to the parasitic infection.

P. MASON-RAB

BERTRAND-FONTAINE Mme FAUVERT R. & SCHWETZER J. Trois observations d'abcès sigues ambulants du foie [Three Cases of Amoebic Abscess of the Liver seen in Paris.] *Bull. et Mém. Soc. Méd. Hôp. de Paris*, 1948, Vol. 30/31 1079–83 1 fig.

During the past year the authors in Paris, have discovered three cases of abscess of the liver in patients who have never been out of the metropolis.

In one active forms of *E. histolytica* were demonstrated in the liver pus and cysts were found in the faeces.

P. J. de la BARRA

BLAS RUIZ, H. GRUNY E. & SCHOUTEN G. Primer caso de absceso hepático por entameba disenterica, observado en el Paraguay. [First Case of Amoebic Abscess of the Liver recorded in Paraguay.] *A. Facultad de Ciencias Med. Asuncion Paraguay* 1948 June 1, R. No. 23 247–55 5 figs.

The following is a translation of the authors' summary:—

The authors describe the first case of liver abscess caused by dysenteric amoebae in Paraguay. The patient was a Netherlands priest who had probably contracted the disease in Turkistan 20 years previously. Operation in Paraguay

in February 1942, together with previous radiological examination, revealed the presence of a right hepatic abscess which had extended into the thorax. Microscopic examination showed entamoebae resembling those described by Councilman and Lafleur. Treatment consisted of emetine injections and tablets of yatrien and stovarsol. The patient was discharged cured within three months.

H J O'D Burke-Gaffney

EL KORDY, M I On the Cultivation of *Entamoeba histolytica* in Hydatid Fluid. *J Roy Egyptian Med Ass* 1944, Aug, v 27, No 8, 329-40 [20 refs] [Recd 13 Dec, 1948]

ERDEI, A Pulmonary Tuberculosis complicated by Amoebic Hepatitis [Memoranda] *Brit Med J* 1949, Jan 1, 18

A woman of 36, who had had pulmonary tuberculosis for some 10 years, had been complaining for 8 of those years of dragging pains in the right iliac fossa, and more recently, in the right epigastric region. The pains were independent of food, worse on standing and were increasing in frequency. The bowels were regular and the stools macroscopically normal. The patient had had three or four attacks of diarrhoea, lasting a few days each, between 1939 and 1944, it appears that blood and mucus were passed on two occasions. The patient had never been in tropical countries, but had been on trips to Paris, the south of France and the Dalmatian coast before the war.

The caecum proved to be ballooned, doughy and tender. A small area of tenderness was detected in the right lobe of the liver, about 2.5 cm to the right of the xiphoid process, and was most pronounced in the intercostal space above. On screening, the right diaphragm was slightly elevated, with diminished movement. On sigmoidoscopy, the rectal mucosa proved to be congested and oedematous, with several submucous haemorrhages and a few small healed ulcers at 10 cm.

There was some hypochromic anaemia, leucocytes were 3,600 per cmm with normal distribution. Among the laboratory tests it is noted that the nicotinic acid tolerance was 450 mgm. Examination of the stools revealed two typical cysts of *Entamoeba histolytica* in the sixth specimen.

The patient was treated with 10 injections of emetine, together with penicillin, and diodoquin and consecutive emetine bismuth iodide and carbarson were given. The liver became very tender after the second emetine injection, but the tenderness disappeared after the sixth.

More attacks of diarrhoea occurred after the improvement from the specific treatment. Later examination revealed the presence of *Giardia intestinalis* in the stools and of *Shigella flexneri* in a sigmoidoscopy swab (but not in the stools). The patient recovered after treatment by sulphasuxidine and *Ec* motions do not now exceed two daily.

The author points out that abdominal tuberculosis figured too prominently in the differential diagnosis and stresses the need for keeping chronic amoebiasis in mind when dealing with obscure conditions. He also points to the value of a rapid liver-function test, such as that of nicotinic acid tolerance.

H J O'D Burke-Gaffney

VERNER, H D Pulmonary Amebiasis due to Hematogenous Spread: Report of a Case. *Bull Charlotte Memorial Hosp* Charlotte, N Car 1948, Dec, v 3, No 1, 3-6

This paper records the rather curious story of a 55-year-old man whose symptoms were directed to his general condition rather than to the tract. These consisted of generalized abdominal pain, a prodromal stage, been common, true, me

liver. There were occasional attacks of diarrhoea with occasional tarry black stools. During this time he was treated, at intervals, with emetine without obvious improvement. On admission to hospital attention was directed to the physical signs at the base of the left lung where on X-ray examination, a non-homogeneous ill-defined consolidation was revealed, while subsequent instillation of Epi-dol showed the appearance of bronchiectasis. Consequently a left lower lobectomy was performed. No specific diagnosis was made but bronchiectasis was not confirmed. Further X-ray films showed consistently a small amount of fluid at the left costo-phrenic angle. One month later a posterior thoracotomy was done and the purulent fluid was drained. The patient was discharged apparently well. Two weeks later he became acutely ill with cough and respiratory signs necessitating a repeated thoracotomy. Subsequently a raised fluctuating swelling appeared in the right upper abdominal quadrant which, on incision, yielded a large amount of thick, creamy pus. From this time onwards he gradually developed septicaemia and eventually died.

At autopsy a typical amoebic ulcerative colitis was revealed extending from the caecum to the descending colon and in the liver there were two large abscesses in the right lobe together with thrombophlebitis of a large radicle of the hepatic vein. This radicle emanated from one of the abscesses and contained a firm adherent thrombus which extended into the vena cava at the junction with the hepatic vein. Histologic sections revealed the presence of numerous *E. histolytica* in the margins of the intestinal ulcers and in the wall of the liver abscesses. renewed search of the sections of the lung, obtained by previous lobectomy also revealed numerous amoebae in the lung tissue.

Two factors were responsible for failure to recognize the true condition in the first instance. In the first place repeatedly negative laboratory examinations of sputum and faeces tended to discourage the diagnosis of amoebiasis and in the second it was difficult to reconcile the position of the lung abscess on the assumption of amoebiasis.

It is claimed that this case illustrates the mechanism of septicaemia. If the organisms travel through the portal system, producing a liver abscess, the latter may give rise to a thrombophlebitis of the hepatic vein, thus creating a secondary focus of dissemination. It is assumed that the liver abscess which was not clinically evident, antedated the pulmonary abscess.

P. MARSH-BALL

DE SALVE A. Sopra un caso di amebiasi e sintomatologia setticemica. [A Case of Amebiasis with Septicaemic Manifestations.] *Bol Sanitario d. Tripoli* Jan.-June v 6 Nos. 1/2, 4-7

The English summary appended to the paper is as follows —

"The author describes a case of amoebiasis which because of its symptomatology is defined as a case of amoebiasis with unusual septic characteristics.

"After having discussed the case from the clinical point of view he gives the pathogenic interpretation of it by postulating that *Entamoeba histolytica* can produce besides the known cytolytic, also a substance capable of toxic action and responsible for the peculiar symptomatology shown by the patient."

DO PRADO Felício C. Simulação
[Intestinal Amebiasis simulated]
The Eng.
"In 500"
was a pre-

34 No.
appended
- genes

pela amebiose intestinal
? Hospital Rio de

as follows —

to 11 cases in which there
the history

ducts, thus suggesting the clinical hypothesis of cholecystitis. The patients showed steady or intermittent pain in the hepatic region, tenderness over the vesicular area, nausea before breakfast, and certain dyspeptic-pain symptoms caused by foods, especially fatty foods. Cholecystography and duodenal intubation did not reveal any abnormality in these patients, feces examination was positive for *Endamoeba histolytica* and the apparently vesicular symptoms disappeared with the specific antiamebic treatment. Such cases are explained by the author to be due to general toxic manifestations acting sporadically upon the vesicular functions, and perhaps, in some cases to a colitis predominating on the hepatic flexure.

"In view of the relative frequency of intestinal amoebiasis the author calls attention to the fact that this organic colonopathy should be mentioned, at the side of the functional, in differential diagnosis of chronic cholecystitis."

CLERC, S & BERGERET, C. Quelques observations d'aspects chirurgicaux de l'amibiase intestinale [Some Notes on the Surgical Aspects of Intestinal Amoebiasis] *Bull Méd de l'Afrique Occidentale Française* 1947, v 4, No 4, 415-20

This short paper consists of brief clinical notes on the cases of eight patients. In three cases abscesses in the right iliac fossa were incised and amoeba were subsequently found in the pus in two of them, in one patient, who was found at necropsy to have multiple liver abscess with amoebae in the pus, perforation of the caecum led to fatal peritonitis, in one patient the diagnosis was made during operation for supposed appendicitis, by the appearance of the caecum which was oedematous and covered by a veil of loose adhesions, whilst the appendix appeared to be normal. The remaining three patients had masses in the left iliac fossa due to perisigmoiditis, two of these suppurated and needed incision, but no amoebae were found in the pus, whilst the third resolved under emetine treatment. All three patients had symptoms of subacute intestinal obstruction and radiological examination after barium enema showed this to be due to pressure on the colon. Emetine treatment brought about rapid improvement and confirmed the diagnosis. The demonstration of amoebae in the granulations forming after incision of an abscess in two cases is so rare that the authors have included a short abstract of a paper on this subject by TOURAINE and DUPERPAT, in which cutaneous amoebiasis is divided clinically into (1) infection by extension (a) following incision of an abscess, (b) perianal, (2) by inoculation (a) cutaneous, (b) genital, (3) allergic dermatoses in patients suffering from amoebic dysentery. Amoebae are found in the stools in 35 per cent of these patients.

W J. Harnett

LAVIER, G, CROSNIER, R & MERLE, F. Le traitement de l'amibiase par la conessine [The Treatment of Amoebiasis with Conessine] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 548-53

A preliminary report [this *Bulletin*, 1948, v 45, 1086] has already appeared from this source on the use of extracts of *Holarrihena africana* [*floribunda*] in the treatment of amoebiasis. This followed the demonstration by DURIEUX *et al* [*ibid*, 905] of the therapeutic activity of conessine in amoebiasis.

Forty-two cases of acute amoebiasis constitute the material for the present report, of which 40 were repatriates to France from the Far East, and 2 from North Africa. With the exception of 3, all these patients had previously been treated with emetine on 3 to 6 occasions. Emetine resistance is common among those repatriated from the Far East; it is either a partial or complete "true resistance to the drug, or a "pseudo resistance" which is amenable to treatment

Both the hydrochloride (13 cases) and the hydrobromide (8 cases) or salt of conesine were used. The drugs were given orally. Initially the dose was 0.5 gm. daily; this was reduced to 0.4 gm. or 0.3 gm. daily if intolerance was manifested. The gross dosages ranged from 3.5 gm. to 6.8 gm. a daily 3.0 gm. were given over a period of two weeks. There was no evidence of "true" toxicity of the compounds; the side-effects chiefly encountered were tremors of a Parkinsonian type (13 cases) and insomnia, nightmares and disturbances of sleep (20 cases). There was improvement in the general health in all cases under treatment and the stools rapidly were restored to normal. Rectoscopic examinations showed the mucosa to have healed completely (13 cases) or substantially (12 cases) after the conesine course.

Seven of 10 cases on re-examination 6 weeks after the conclusion of treatment had no parasites in the stools (number examined unspecified). Of the other three patients one was passing loose stools containing amoebae; the remaining two were passing cysts. All these three were again rapidly sterilized by retreatment with conesine. As conesine is not invariably successful in eradicating an *E. histolytica* infection, it should be followed by further therapy to forestall relapse; suggestions are made as to the nature of this after-treatment.

[The words cure and sterilization are used in this paper for clinical cure and "temporary absence of parasites from the stools" respectively. The claims that the results of conesine treatment are brilliant and that the drug is superior to emetine in the treatment of amoebiasis do not appear to the reviewer to be substantiated by the evidence presented.]

I. R. D. Adams

CHOU T. C. & JANG C. S. Chemotherapeutic Studies on Ya Tan Tze. 2. Ya Tan Tze (*Brucos javanica*) on Experimental Amebiasis. *Chinese Med J Shanghai*. 1948, July v 63, No. 7 330-63. (14 refs.)

"Ya Tan Tze the seed of *Brucos javanica*, and its crystalline principles, substances A, B and C have been tested for their therapeutic value on experimental amebiasis in dogs. The whole kernel of the drug is highly effective in eliminating the parasite but the survival periods of the treated animal are not prolonged. The substance B a phenolic compound, acts like the crude drug and may therefore represent its active principle. In the doses used both the crude drug and the substance B produce vomiting and diarrhea and other signs of gastro-intestinal irritation. The other two principles A (an organic acid) and C (a glycoside) have been tried on one case each and the result are therefore inconclusive."

SORRY H. J. A Note on the Treatment of Amoebic Infection with *Brucos javanica* Seeds. *Chinese Med J Shanghai*. 1948, July v 63, No. 7 363-5.

A cold aqueous extract of *Brucos javanica* seeds was found to be highly amoebicidal *in vitro*; hot aqueous extracts were feebly so and alcoholic extracts were not amoebicidal [for earlier work on this plant see this Bulletin, 1937 v 34 855].

Twenty-eight Chefoo University Hospital employees found to be passing *E. histolytica* cysts were treated orally thrice daily for ten days with 0.1 gramme pulverized decorticated seeds of *B. javanica*. Nearly half of these persons suffered from nausea and vomiting while on the drug, one so severely that the treatment had to be stopped; a few had dizziness or mild diarrhea; no individuals suffered no side effects at all. Two months later the stool of 35 of these patients were re-examined and 17 of them found still to be passing cysts.

Seventeen patients with acute amoebic dysentery were similarly treated by the oral route, either *ab initio* or after a few preliminary injections of emetine. Improvement followed in every case, and 2 patients appeared to be sterilized of their infections four weeks after conclusion of treatment, while 10 showed no *E histolytica* at the end of treatment. A R D Adams

DFSCIENS R, LAMY, L & MARCHAL, G Mlle Sur un flagelle indetermine isolé des selles d'un français revenant de Guinée [An Unidentified Flagellate isolated from the Stools of a Frenchman returned from Guinea] Bull Soc Path Exot 1947, v 40, Nos 11/12, 435-9, 4 figs

In the stools of a Frenchman returned from Guinea, the authors found *Dientamoeba fragilis*, *Eutamoeba histolytica* and a flagellate at first identified as *Trichomonas hominis*. They isolated and maintained cultures of an amoeba and the flagellate, however, at the end of a month they lost the amoeba, but the flagellate culture was maintained for over three months, by means of numerous subcultures. The medium they used was coagulated horse serum, Ringers' solution, rice starch and "1 162F" [no indication of the composition of this is given] in a concentration of 1 in 1,000, with periodic transfers to whole egg with the same medium (containing 1 162F) added.

It was soon realized that the flagellate was not a *Trichomonas*. It was round, 7µ in diameter, with three flagella and no undulating membrane, it had a large nucleus with a large central karyosome, in a single mass at the periphery of the cytoplasm. The characteristic feature was a large club-shaped appendage, 4µ in length that protruded from the body of the flagellate. *Joenia annectens*, in Grassi and other authors have described a flagellate, *Joenia annectens*, in termites with a similar pseudopodic protusion but this parasite differs from *Joenia* in other respects. The authors consider that it has the characters of an *Enteromonas*, but of a species not previously described. They have named it *Enteromonas hercynica* n sp, pending further study to decide if it constitutes a new genus. L E Napier

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

VIGORS CARL G K La fiebre recurrente [Relapsing Fever] Rev Ecuatoriana de Hig y Med Trop Guayaquil 1944, Dec, v 1, No 4, 362-72, 1 fig, 1 chart & 1 map [24 refs]

The English summary appended to the paper is as follows —

- 1 Three cases of relapsing fever diagnosed by the discovery of *B recurrentis* in the blood examination, are described
- 2 All of the cases acquired their infection in the Province of Esmeraldas where infection is most likely to occur are indicated
- 3 The localities within the province and adjacent Colombian territory in *Enteromonas*, but of a species not previously described. They have named it *Enteromonas hercynica* n sp, pending further study to decide if it constitutes a new genus.
- 4 An account of the occurrence of the disease in adjacent Colombian territory is given
- 5 The heightened susceptibility of Europeans, white Americans and non-resident Ecuadoreans to the disease is pointed out
- 6 The probable role of *Orrhodossia venezuelensis* described by Leon, as a transmitting agent from animal to man, is commented upon
- 7 Animal reservoirs (mammals) are listed
- 8 Some aspects of treatment with arsenicals and penicillin are considered

LEPROSY

HAMERS, S. L. T. M. & HERMANS, E. H. Enkele waarnemingen bij leprospatiënten in Nederland. [Some Observations on Leprosy Patients in the Netherlands.] *Aardrijksch. v. Geneesk.* 1948, Oct. 23 v. 9 (n) No. 43 3409-19 6 figs. on 3 pls. English summary

In a rather discursive paper some data are given upon 40 new leprosy patients segregated in the leprosy centre in Holland. There appears to be no evidence that the infection was contracted in the former Japanese prison camps in the Dutch East Indies. The earliest symptoms were occasionally directed to the nose more commonly to fatiguability but most frequently there was an eruption symptoms of nervous irritability or nerve injury. The Mitsuda reaction gave accurate information upon prognosis, whilst the new American classification compared favourably with its forerunner. It can be correlated to the bacteriological and patho-anatomical findings. P. Manson-Bahr

See also p 348 WESTER. AUSTRALIA, Report of the Commissioner of Public Health for the Year 1947

CORREA, R. A. O bacilo de Hansen. Morfologia e fisiologia. [Morphology and Physiology of Hansen's Bacillus.] *Rev. Serviço Vac. de Lepros.* Rio de Janeiro 1944 Sept., v. 3 No. 3 29-33

A general review

ROSBELL, C. S. C. Novos cultivos cromogênicos de bacilos ácido-álcool resistentes isolados de mosquitos (*Culex*) capturados sobre leproso. II nota. [New Chromogenic Cultures of Acid Fast Bacilli Isolated from *Culex* Mosquitoes fed on Leprosy Patients.] *Mém. Inst. Oswaldo Cruz.* 1947 Dec., v. 45 No. 4 793-812 4 figs.

The English summary appended to the paper is as follows -

"The author describes three new samples of cultures of acid-fast bacilli isolated from wild mosquitoes experimentally fed on active cases of leprosy in the South of the State of Minas Gerais, about 1 mile distant from Santa Fé Leprosy Colony

All those cultures are chromogenic and germinate quite well on Loewenstein medium and in glycerinated broth (forming thin veils) on the surface of this medium without clouding it.

Out of 100 slides smeared with intestinal contents from wild mosquitoes fed on leprosy, 22 were positive for acid-fast bacilli similar to those of Hansen and out of 100 slides smeared with domestic mosquitoes captured in leprosy dormitories, 90 were also positive

"Fifty smears from mosquitoes captured on horses were negative for typical acid-fast bacilli.

CORREA, R. A. Técnicas utilizadas com o bacilo de Hansen no diagnóstico leproso. [Bacteriological and Serological Methods used in the Diagnosis of Leprosy.] *Rev. Serviço Vac. de Lepros.* Rio de Janeiro 1944 Dec. 3 v. 4 31-51 [160 refs.]

A general review

DHARMENDRA & MUKHERJI, N. Leprosin Reactions in Rejected Leprosomata Cases. *Leprosy in India* 1947 Jan. v. 19 No. 1 5-10

After summarizing previous work on this point the authors record a careful study with illustrative tables of their experience in 17 out of 125 active cases

of leprosy in which a weakly positive lepromin reaction de-
 17 cases the subsidence of symptoms had persisted for 2 to 5
 9 a slight or marked relapse had occurred, with lesions be-
 logically positive in half Of the first series of 8 cases, the reaction [Personal
 doubtful or weak positive in 6 In the 9 cases in which relapse had Dec, v 4,
 negative and two weak positive reactions had been noted in the ac-
 after subsidence of the disease, in 5 the reaction remained negative an-
 remaining 4 a decrease was noted in 2 and an increased reaction in the o-
 Relapses are therefore less frequent in subsided cases in which incre-
 reactions were noted

L Rogers

DHARMENDRA & JAIKARIA, S S Failure to sensitize presumably Non-Leptous
 Individuals to Lepromin *Leprosy in India* 1947, Jan, v 19, No 1, 16-17

"We have, therefore, failed to confirm the findings of Fernandez that an
 injection of lepromin sensitizes lepromin-negative non-leptous persons so that
 they become lepromin-positive"

CUNHA R A Serologia da lepra [Serology of Leprosy] *Bol Serviço Nac de Lepra*
 Rio de Janeiro 1944, Dec v 3 No 4, 3-30

A general review

RABELO, F E A Aspectos do diagnostico diferencial da lepra [Points in the
 Differential Diagnosis of Leprosy] *Bol Serviço Nac de Lepra* Rio de
 Janeiro 1945, Mar, v 4, No 1, 40-51

This article is one of a series of notes for a course of lectures on leprosy for
 members of the National Health Service, apparently delivered, at all events
 prepared for, in 1942 This one deserves special mention because it brings
 together and points out in tabular form the differential diagnosis between
 leprosy and skin conditions which in one or more aspects resemble leprosy
 Lack of space precludes their being recorded in detail here, but the general
 lines of treatment of the subject should be indicated The diseases mentioned
 are syphilitic roseola and leuco-melanoderma, polymorphic exudative erythema,
 erythema nodosum, centrifugal annular erythema, psoriasis, vitiligo and pinta
 In each case, the site commonly involved is stated and the appearance, the
 course and the histology of the lesions This information can be found in
 publications dealing with leprosy and the better works on cutaneous diseases,
 but it is very convenient to have them collected thus in a single contribution
 by a leprologist of repute

H Harold Scott

CHAUSSINAND R La classification de la lèpre [The Classification of Leprosy]
Bull Soc Path Exot 1948, v 41, Nos 3/4 249-60

RABELO F E A As formas clinicas da lepra sob o ponto de vista da epidemiologia
 e da profilaxia [Clinical Forms of Leprosy from the Epidemiological and
 Preventive Aspects] *Bol Serviço Nac de Lepra* Rio de Janeiro 1945 Mar,
 v 4, No 1, 28-39

SILVEIRA, L M O mal perfurante plantar na lepra [Perforating Plantar Lesions
 in Leprosy] *Arquivos do Serviço Nac de Lepra* Rio de Janeiro 1946 Dec
 v 4, No 3, 182-203, 40 figs

HAMERS S
leprosy
in the
No. 1
In a
negative
the
f

S
leprosy
in the
No. 1
In a
negative
the
f

I
relapsed
in the
other
relapsed
in the
other
relapsed
in the
other

relapsed
in the
other
relapsed
in the
other
relapsed
in the
other

379

les viscerales en la lepra tuberculode como en
tro de la clasificación sud-americana. [Visceral
my] *Arquivos do Serviço Vac de Lepra*. Rio de
o 1 13, -42, 8 figs. [16 refs.]

known concerning the occurrence of visceral
leprosy. The author has had under his care
of age who had at the age of 7½ noticed a
his right thigh with definite contour red in
1.5 to 8 cm. in diameter when a similar spot
right arm, with alteration in sensibility and
pt. When the author saw him the macule
and there was diminished sensibility to heat

Smear were seen in smears of the cutaneous lymph. Biopsy
specimens were taken of the skin, the liver, a mesenteric gland, epiploon and
the sternal marrow under a general anesthetic. In the gland and epiploon
Myco leprae were seen and in smears of the liver [but, later, under the de-
scription of the separate tissues is the statement that "bacteria were not met
with on direct examination"] In the tissues lymphocytic infiltration was
observed, with eosinophil increase and histioid proliferation which the author
interprets as indicating that tuberculoid leprosy is not confined to the skin and
superficial glands but is a generalized condition affecting all the organs, setting
up pathological processes different from those of the lepromatous form

H Harold Scott

RAJAH Z. J., RAJ M. P. & COCHRANE, R. G. A Short Note on Experimental
Investigations on the Optimum Dose of Hydnoctarpus Preparations at the
Lady Willingdon Leprosy Sanatorium, Chingleput, S. India. *Leprosy in
India* 1948 July, v 20 No. 3 146-8

Tests have been made to find the optimum dose of hydnoctarpus preparations
by the use of 10 cc. 10-15 cc. and 15-25 cc. respectively in different groups of
cases with the result that 15 per cent. became negative on the highest dose
against only 9 per cent. on the lowest one but as the lower-dose group included
more advanced cases the test was repeated, with a better distribution of cases.
This showed 18 per cent. became negative on the high 33 per cent. on the
medium and 24 per cent. on the lowest dose. Further tests were carried out
with intradermal injection only, subcutaneous injection alone or both methods
combined and the combination of methods gave the best results which were
confirmed by a repetition of the test.

L. R. Gers

BICHELLI L. M. & ROIZBERG, A. Terapêutica chaulmoogrica da lepra. A
eficiência do chaulmoogra, de acordo com o estudo de 2.201 casos de alta.
[Chaulmoogra in Leprosy. A Study of 2,201 Patients.] *Arquivos do Serviço
Vac de Lepra*. Rio de Janeiro. 1948, Dec., v 4 No. 7 303-74 1 graph.

This contribution analyzes the 2,201 cases, some of which were referred to
in the preceding abstract. Of 411 of the lepromatous type 224 had prevented
themselves with relapse, 163 remained out and apparently well 1 had died,
8 had been transferred elsewhere and 2 had ceased to attend for treatment.
Of 1,221 "non-characteristic" 229 had relapsed, 808 were at liberty 60 had
died, 31 had gone elsewhere and 2 had ceased to attend of 549 of the tuberculoid
form 57 had had relapses 471 were up and about 24 had died, 16 had been
transferred and one discontinued treatment.

H Harold Scott

ROTBERG, A & BECHELLI, L M Terapêutica chaulmoôgrica da lepra Resultado do tratamento chaulmoôgrico na lepra observações pessoais e estudo de 2,201 casos de alta registrados em nosso serviço [Personal Observations on 2,201 Leprosy Patients treated with Chaulmoogra Oil] *Arquivos do Serviço Nac de Lepra* Rio de Janeiro 1946, Dec, v 4, No 3, 352-63, 7 figs

For oral administration the pure oil was used and for intramuscular or intradermal injection the esters. The authors aimed at giving 100 cc in 10-30 weeks, after which a rest of 15-20 days was interposed. When a total of 300 cc is reached (in 40-100 weeks), 2-3 months are allowed to elapse before another course is started. In children the dose used is smaller, 1-2 cc once or twice weekly, at times 3 cc, and the course is 100-200 cc according to the tolerance.

A table is given showing the results in 679 cases of the lepromatous form. Of 101 receiving up to 100 cc of the oil, 95 were worse, 5 were unchanged and one was better; of 92 receiving up to 200 cc 76 were worse, 14 unchanged and 2 improved; 10 patients received more than 2,000 cc, of these 8 were worse, 2 were better. Altogether of the 679, 581 (85.5 per cent) were worse, 75 (11.04) were unchanged, and only 23 (3.4) had improved.

Of the other forms, non-characteristic and tuberculoid, nothing definite is said, and the results would be difficult to gauge seeing that spontaneous remissions are fairly common in them.

H Harold Scott

FLOCH, H Influence du traitement par l'huile de chaulmoogra sur l'évolution de la lèpre [Chaulmoogra Treatment and the Evolution of Leprosy] *Arquivos do Serviço Nac de Lepra* Rio de Janeiro 1946, Dec, v 4, No 3 257-70

This paper deals with an analysis of 358 leprosy cases treated "more or less" for periods of 3 to over 12 years, with Chaulmoogra oil, with a view to determining the most efficient method of using the remedy. The first table shows ages and sexes. Bacteriological examinations, given in Table II, showed lepra bacilli on the skin in only 7 per cent of 234 cases and none in the nose among 196 maculo-anaesthetic cases. In nerve cases, 1 of 34 was skin-positive only. On the other hand, 66 of 68 lepromatous cases were positive bacteriologically in skin leprosy. Chaulmoogra oil was given intramuscularly in varying total amounts and frequencies shown in another table, which brings out the important points that in maculo-anaesthetic cases given a total of over 300 injections, 60 per cent were benefited against 45 per cent in those who were not so treated. Among 34 nerve cases the progress was not influenced by the number of injections. In the lepromatous form, improvement was seen in 45 per cent of those receiving an annual mean of 40 to 50 injections, but in very advanced cases the percentage fell to 25-30 per cent, as is shown in a table. The importance of long regular treatment is also shown in a table, 40 per cent of lepromatous cases benefited by treatment over the full period, as compared with 21 per cent who improved with shorter periods of treatment. Thus the treatment is more effective when it is carried out regularly for long periods than it is with shorter periods and frequent interruptions. This is in accordance with other recent experience. In a final table, this is confirmed by the finding that 50 per cent of those regularly treated for a sufficiently long period improved as compared with only 27 per cent who had irregular treatment with long intervals, instead of regular weekly injections for a minimum of three years.

L Rogers

ROTHBERG, A. & BECHELLI, L. M. BECHELLI, L. M. & ROTHBERG, A. Terapêutica chaulmoogrica da lepra. Apontando crítico sobre a literatura do tratamento chaulmoogrico da lepra. 1a Parte—Sa Parte. [A Critical Review of the Literature relating to Chaulmoogra Treatment of Leprosy.] *Arquivos do Serviço Vac de Lepra*. Rio de Janeiro. 1948, Dec. v 4 No. 3 313-18 [15 refs.] 314-25 [22 refs.] 325-32. [4 refs.] 332-8 [4 refs.] 340-47 [11 refs.]

ROTHBERG, A. & BECHELLI, L. M. Terapêutica chaulmoogrica da lepra. F. Ideia a considerar na valiação dos resultados da terapêutica antileprotica. 1a Parte [Factors in the Assessment of the Results of Anti-Leprosy Treatment, with special references to Chaulmoogra. 1st Part.] *Arquivos do Serviço Vac de Lepra*. Rio de Janeiro. 1948, Dec. v 4 No. 3 291-300 3 figs. & 2 graphs

BECHELLI, L. M. & ROTHBERG, A. Terapêutica chaulmoogrica da lepra. F. Ideia a considerar na valiação dos resultados da terapêutica antileprotica. 2a Parte. [Factors in the Assessment of the Results of Anti-Leprosy Treatment, with special references to Chaulmoogra. 2nd Part.] *Arquivos do Serviço Vac de Lepra*. Rio de Janeiro. 1948, Dec. v 4 No. 3 300-313 14 figs.

CHAUSSINAND, R. PARIS, C. & CROUGER, O. Essais d'un traitement ambulatoire de la lepre par la streptomycine émulsionnée dans les esters éthyliques de chaulmoogra. [Streptomycin with Chaulmoogra Esters in Leprosy?] *Bull Soc Path Exot* 1948, v 41 Nos. 9 10 573-8.

This paper records a trial of streptomycin and chaulmoogra esters in two cases of leprosy. The first was an advanced lepromatous case with numerous lepra bacilli in the nose and in nodules, and of about 7 years duration. Daily injection of 1 cm. chaulmoogra esters with streptomycin in doses rapidly increased from one-third of a million to two million U.S. were continued for 79 days when they ceased to be absorbed. During that period a total of 42 million of U.S. unit were given. A notable reduction of diffuse infiltration of the face and ears but not of other cutaneous lesions was noted, together with diminution of nasal lepra bacilli, but those in the nodules were unchanged. The improvement was not greater than with chaulmoogra esters alone in the period of treatment. A second case was therefore treated in the same manner. This patient had signs of cutaneous erythematous lesion of the lepromatous type with numerous lepra bacilli but no infiltration. It was hoped that streptomycin might be more effective in such a comparatively early stage. The treatment was continued for 86 days, during which 135½ million units of streptomycin were given together with chaulmoogra esters. Only a minimal modification of the cutaneous lesions was obtained and there was no diminution in the cutaneous lepra bacilli although a slight bacterial infection of the nose cleared up. As far as these two cases go there was no definite evidence of any effect of the large and costly streptomycin treatment. See also FAGER and ENICKSON in *Bullet* 1948 v 45 442, 615.] L. Rogers

SOMTA LIMA, L. & CASTRO LEMQUEIRA, G. de Tratamento e profilaxia da lepra pelas diamino-di-fenil-sulfona. Trial Treatment of Leprosy with Diamino-Diphenyl Sulphone. *Arquivos do Serviço Vac de Lepra*. Rio de Janeiro. 1948, Dec. v 4 No. 3 78-89 5 figs. on 23 pls.

The crucial test of all treatment of leprosy must be their results in lepromatous cases because tuberculous forms and many of the non-characteristic forms tend to retrogress spontaneously.

The author here put on record the result of the use of diamine and pristin. Diamine was given orally in capsules containing 0.375 gm for 6 weeks followed

by two weeks' rest. One capsule daily was given for 3-4 days, then two for the same period and after that three capsules, or 0.99 gm, for the daily dose. This drug was given to 38 patients, 12 in an advanced stage, 20 "moderate", and 6 incipient cases.

Promin was administered intravenously to 42 patients, 17 advanced, 23 "moderate" and 2 incipient, starting with 1 cc, and gradually increasing to 5 gm [so stated, but the strength of the solution is not mentioned]. The drug was given daily for 15 days, followed by 7 days' rest. The red cells were counted and the haemoglobin estimated every 10 days. The following criteria were observed for estimating results: 1 *Dermatological*—comparison of the cutaneous condition before and after and at intervals during the treatment. 2 *Histological*—comparison of the histo-pathological picture before and at intervals after. 3 *Bacterioscopic*—the numbers and characters of the bacteria in smears and sections of the skin lesions. 4 *Clinical*—the general condition, including the ophthalmological and the oto-rhino-laryngeal.

Each of these is recounted and discussed in detail and the results shown in an elaborate series of tables, but much more will be gathered from a study of the excellent photographs of patients before treatment and during and after the courses. The histological changes are also well shown by photomicrographs. The results may briefly be summarized thus: Of the 38 receiving diasone, all 12 in the advanced stage showed some improvement, 3 marked improvement, 8 were better and one slightly better, of the 20 "moderate" cases 5 were much improved, 10 improved, 3 slightly better, 2 were unchanged, and of the 6 incipient cases one was much improved and the other 5 improved.

With promin treatment: Of the 17 advanced cases, 6 were much improved, 9 improved, one remained unchanged and one was worse, of 23 "moderate" cases 7 were much improved, 10 improved, 4 slightly better, 2 remained unchanged, both the incipient cases were much improved. In other words, of the total 80, marked improvement was reached in 24, considerable improvement in 42, slight in 8, 5 remained unchanged and one only was worse. [The numbers in the text have been added wrongly.]

In their conclusions the authors state that the drugs are well tolerated by leprosy patients of any age and are free from danger, if ordinary precautions are taken, that the drugs are active, clinically and bacteriologically, in the treatment of this disease, though the extent of this activity cannot at the moment be stated definitely, that they act beneficially on the eye symptoms and on those due to affection of the nose and throat, and that they certainly exercise a bacteriostatic, and possibly a bactericidal action, and, finally, that they seem to be the most efficient of drugs at present known in the treatment of leprosy and that they should be more widely used.

H Harold Scott

FIGUEREDO, N & DESAI, S D The Importance of Home Visits in the Control of Leprosy in Bombay City *Leprosy in India* 1948, July, v 20, No 3, 149-52

In 1941 the importance of home visits to follow up leprosy cases was emphasized and in 1942 the Clinic of the Ackworth Leper Home appointed two trained health visitors for this purpose, as 30 to 35 per cent of the cases attending the clinic were ceasing to come. Moreover the examination of contacts was unsatisfactory, as was the separation of healthy children from infectious cases many of whom could not be accommodated at the Ackworth Home. Visits of the health visitors to overcome these deficiencies during 1943 to 1947 amounted to nearly 14,000 and included the examination of over 7,000 contacts with the discovery of 445 suspected or clear cases of leprosy. Moreover 159 out of 412 patients were induced to resume attendance at the Clinic, which

The contagiousness of leprosy is next discussed and a number of cases of accidental inoculation of the infection are quoted. Infection through contact is pretty certainly due to close and long association, so it is largely a "familial disease" with relatively low infectivity. The bed bug is a more likely carrier than the cockroach. The Nauru epidemic is quoted as an example of control by isolation only of the bacteriologically positive infectious cases, and South African experience as a demonstration of the much greater effectiveness of the modern plan of only isolating with effective treatment infectious cases coming forward in the early stages of the disease. The author concludes that "To-day, however, there remains no doubt that one can save energy and money by isolating only the malignant lepromatous and NOT the Hansenite [uninfective] patients"

L. Rogers

McCoy, G. W. Leprosy Factors in Public Health Management. *Pub Health Rep* Wash 1948, Nov 19, v 63, No 47, 1522-6

This paper deals with the prophylactic measures, from the American point of view. The author first states that "We hope that by now the routine control procedure—isolation of all cases of leprosy regardless of the possibility that some patients may not be a menace to their associates—has been discarded as there is no substantial evidence that it aided in controlling infection." The value of promising therapeutic agencies (sulphones) first tried by G. H. FAGER and his associates, will, it is hoped, lead to earlier and more effective treatment. Only the lepromatous and mixed lepromatous and neural types are likely to be sources of infection and to require isolation. Neural and anaesthetic cases are relatively free from danger of transmitting infection and should receive the benefit of the doubt and not be compulsorily isolated. The tuberculoid sub-type is also unlikely to be transmitted.

In diagnosis it is pointed out that in nasal smears a few non-leprosy acid-fast bacilli may sometimes be found, but bundles of such organisms are of diagnostic value. Histological changes may be misleading unless lepra-bacilli are present. Cases with nerve symptoms who have never lived in a leprosy area, are very unlikely to be leprosy. The disease in the U.S.A. is only a problem in the southern Gulf of Mexico States. From the public health point of view, the author advises that no special consideration is required for non-communicable cases where transmission is unlikely, home isolation or general hospital care are recommended for any cases where transmission is unlikely, and special hospitals for communicable cases where spread is likely to occur.

L. Rogers

ASHBEL R. & POLJAKOFF, A. In Vitro Cultivation of the Rat Leprosy Organism. *J Infect Dis* 1948 Nov-Dec v 83, No 3, 279-82, 1 fig

CHAUSSINAND, R., PARIS, C. & CROUGUE, O. Essais de traitement par la streptomycine de l'infection murine due au bacille de Stefansky [Trials of Streptomycin in Rat Leprosy]. *Ann Inst Pasteur* 1948, July, v 75, No 1, 92-4

The direct action of streptomycin on Stefansky's bacillus of rat leprosy cannot be tested because that organism has not been cultivated, but the preparation did not have any effect *in vitro* in altering the appearances of the bacilli or their staining properties. Further, rats inoculated with the rat leprosy bacilli which had been exposed to the action of streptomycin were readily infected in a similar manner, as with the untreated organism. The action of the preparation was then tried *in vivo* by treating 30 infected rats with streptomycin and keeping 15 more as controls. The treatment was commenced

two and a half months after inoculation when infiltration could just be detected at the site of infection. Doses of 4,000, 8,000 and 16,000 U.S. units respectively were injected subcutaneously every other day for two months and the rats were killed from two to seven months after commencement of the treatment but the lesions observed were similar in the treated and untreated rats. The drug was then given to another series of animals up to doses of 16,000 units as before but commencing two days after inoculation with rat leprosy bacilli again no differences were found in the degree of infection after two to seven months. A further test in the more resistant mice also gave negative results a total of 180 rats and 40 mice being tested. Streptomycin may therefore be classed as ineffective against *Streptomyces* bacillus of rat leprosy.

J. R. R. R.

HELMINTHIASIS

BROWN M. SINCLAIR, R. G. CROOK, L. B. & CLARK, G. C. with E. KUTNER.
Eskimo Intestinal Parasites of Eskimos on Southampton Island Northwest Territories. A Preliminary Survey. *Canadian J. Pub. Health* 1948 Nov. 39 No 11 451-4

"A study of intestinal parasites among 85 Eskimos on Southampton Island, N.W.T., showed that 33 individuals or 34.7 per cent. were infected with the following parasites: *Enterobius vermicularis* (22 cases), *Diphyllobothrium* sp. and *E. vermicularis* (3 cases), *Diphyllobothrium* sp. (8 cases), *Endamoeba* (in 1 case), *Giardia lamblia* (1 case). The specimens examined were 83.3% stool and 71 faecal samples.

"A varying degree of blood eosinophilia up to 56 per cent. was found in 79 cases examined. There appeared to be no relation between the percentage of eosinophils and the parasitological findings recorded.

RODRIGUEZ M. J. D. Parasitismo intestinal en los escolares de Guayaquil (Intestinal Parasitism in Schoolchildren in Guayaquil). *Rev. Latinoamericana Hig. y Med. Trop. Guayaquil* 1944 July 1 N. 2, 11-4

ALVARADO CRISTO J. Parasitismo intestinal en enfermos hospitalarios de Guayaquil (Intestinal Parasites in Hospital Patients in Guayaquil). *Rev. Latinoamericana Hig. y Med. Trop. Guayaquil* 1944 Apr. 1 N. 2, 203-10 21-11

Hsu K. C. A Survey of the Helminths of Dogs in Chengtu, Szechuan. *Chung Hsi Med J. Shanghai* 1948 July 69 N. 7 366-70 [19-11]

(1) A survey of the helminths of 169 dogs in Chengtu was conducted and every dog was found to be infected. The number of pieces of parasites harbored by each dog varied from 1 to 7.

(2) The percentage of dogs harboring round worms was found to be 80.5 per cent. They were *Uncinaria stenocephala*, *Toxocara canis*, *Spurercia sanguinolenta*, *Diphyllobothrium* and *Thalassius calypso*.

(3) The percentage of dogs harboring cestodes was 69.7 per cent. They were *Taenia hydatigena*, *Diphyllobothrium* spp. and *Diphyllobothrium* spp.

(4) The percentage of dogs harboring trematodes was 8.4 per cent. They were *Clonorchis sinensis*, *F. agnatum* spp., *Metagonimus* spp. and *Microstomum* spp.

" (5) *Microtrema truncatum* is reported probably for the first time as occurring in dogs in China "

PANAYOTATOU, Angelique. Nouvelles recherches sur la Bilharziose Vésicale causée par (*Schistosoma haematobium*) guérie par l'antimoine thiomalate de lithium. [Studies of *Schistosoma haematobium* Infections cured by Antihomalline] *J. Rev. Egyptian Med.* 1st 1943 Feb., v 26 No 2 66-71 [Recd 13 Dec 1948]

MALDONADO J F & ACOSTA-MATIENZO, Josefina. Biological Studies on the Miracidium of *Schistosoma mansoni*. *Amer J Trop Med* 1948, Sept., v 28 No 5, 645-57

The authors carried out experimental studies on the hatchability, longevity and infectivity of the miracidia of *S. mansoni*, under controlled laboratory conditions. The material used and the experimental procedure are described in detail.

Hatching—Few miracidia emerged in the first hour but on exposing the eggs to artificial light, hatching proceeded rapidly. Out of 1,971 eggs 1,660, or 83.6 per cent hatched out. Of these, 65 per cent did so during the first eight hours and 24 per cent in the following 16 hours. Thus in the first 24 hours, 89 per cent of the hatching was completed. During the second 24 hours, about 9.5 per cent hatched and the remaining 1.5 per cent hatched early on the third day.

Longevity—Percentage mortality rates among similar batches of miracidia kept from one to nine hours respectively were as follows—8.6, 13.6, 21.5, 34.9, 32.3, 60.9, 62.7, 74.7 and 100. The average span of life was between 5 and 6 hours. The longevity of miracidia which hatched in the first 24 hours was observed to be greater than that of miracidia which hatched after a long time.

Infectivity—Snails (*Australorbis glabratus*) were exposed to miracidia for varying periods after hatching and their infectivity was estimated on the basis of observed penetration or failure to find the miracidia in the vessels after exposure. Of 103 miracidia exposed to the snail immediately after hatching, 71.8 per cent penetrated. This proportion gradually decreased to zero within 8 to 9 hours of free life.

The sites of penetration were observed in a batch of 110 miracidia. Of these 66.3 per cent chose the head-foot organ, 27.3 per cent the tentacles and 6.4 per cent the mouth collar.

J J C Buckley

DA SILVA, J R. Contribuição ao estudo das formas evolutivas da esquistossomíase mansoni. [Contribution to the Study of the Clinical Evolution of Infestation by *Schistosoma mansoni*] *Rev. Brasileira Med.* Rio de Janeiro 1948, Nov., v 5, No 11 794-802, 5 figs. [23 refs.] English summary.

In the clinical study of schistosomiasis it is clear that the parasitic activity is all-important. To determine this, the viability or otherwise of ova passed in the faeces is not a reliable guide, but a study of the ova obtained by rectal biopsy is. Eggs thus obtained may be living or dead, if living they may be mature or immature, or may show altered development, and in gauging the results of treatment examination of the ova may show whether they have died shortly before, some time before and become calcified, or have left empty shells. The action of specific drugs is not, it is believed, upon the eggs themselves directly, but upon the female worms, preventing oviposition. Hence, rectal biopsy and examination of ova so obtained are of value in assessing the results

two and a half months after inoculation when infiltration could just be detected at the site of infection. Daily doses of 4 000 6 000 and 8 000 U. S. units respectively were injected subcutaneously every other day for two months and the rats were killed from two to seven months after commencement of the treatment, but the lesions observed were similar in the treated and untreated rats. The drug was then given to another series of animals up to doses of 16 000 units as before but commencing two days after inoculation with rat leprosy bacilli again no differences were found in the degree of infection after two to seven months. A further test in the more resistant mice also gave negative results a total of 190 rats and 40 mice being tested. Streptomycin may therefore be classed as ineffective against Stefansky bacillus of rat leprosy.

L. Rogers

HELMINTHIASIS

BROWN M. SINCLAIR, R. G. CROOK L. B. & CLARK, G. C., with E. HUTTIN & EKEAUM. Intestinal Parasites of Eskimos on Southampton Island, Northwest Territories. A Preliminary Survey. *Canadian J. Pub. Health* 1948 Nov. 1 39 No 11 451-4.

"A study of intestinal parasites among 95 Eskimos on Southampton Island, N. W. T. showed that 33 individuals or 34.7 per cent., were infected with the following parasites: *Enterobius vermicularis* (22 cases) *Diphyllobothrium* sp. and *E. vermicularis* (3 cases) *Diphyllobothrium* sp. (8 cases) *Endimeria* sp. (1 case) *Giardia lamblia* (1 case). The specimens examined were 80 NTBI smears and 31 faecal samples.

"A varying degree of blood eosinophilia, up to 56 per cent., was found in 79 cases examined. There appeared to be no relation between the percentage of eosinophils and the parasitological findings recorded.

RODRIGUEZ M. J. D. Paratuberculosis intestinal en los escolares de Guayaquil. [Intestinal *P. rathii* in Schoolchildren in Guayaquil.] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1944 July 1 No. 3 231-4.

ALVAREZ CRISTO J. Paratuberculosis intestinal en enfermos hospitalarios de Guayaquil. [Intestinal Parasites in Hospital Patients in Guayaquil.] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1944 Apr. 1 No. 2 203-10 [23 ref.]

Hsu K. C. A Survey of the Helminths of Dogs in Chengtu, Szechuan. *Chinese Med. J. Shanghai* 1943 July 66 No 7 361-70 [19 refs.]

(1) A survey of the helminths of 169 dogs in Chengtu was conducted and every dog was found to be infested. The number of pieces of parasites harbored by each dog varied from 1 to 7.

"(2) The percentage of dogs harboring round worm was found to be 60.5 per cent. They were *Uncinostoma caninum*, *Ancylostoma* sp. and *Uncinaria stenocephala*. *Toxocara canis*, *Spurocercia sampso oleus*, *Diphylaria immitis* and *Thelazia callipaeda*.

"(3) The percentage of dogs harboring cestodes was 69.7 per cent. They were *Taenia hydatigena*, *Diphyllobothrium* sp. sens. and *Diphylidium* sp. novum.

(4) The percentage of dogs harboring trematodes was 8.4 per cent. They were *Clonorchis sinensis*, *Paragonimus* spp. *Metagonimus yokohamae* and *Microstomum* sp.

performed on April 12th The dura was adherent to the posterior portion of the third middle frontal convolution and on the surface of the inferior frontal convolution a number of nodules, from pin-point to 2 mm in diameter, were observed Biopsy showed *S japonicum* ova There was immediately some improvement and this continued after three courses of stibophen (of 14 injections each with 5 ml as the maximum dose), however, he had several Jacksonian fits By May 20th 1947, the only residue was minimal aphasia No schistosome ova were found elsewhere in this patient

Case 2—An ex-service man, aged 22, with service in Leyte, gave a history of attacks of unconsciousness with left-sided twitchings, preceded by numbness of the left knee and headaches He was first seen on December 22nd, 1946 The subsequent seizures all involved the right side and he did not lose consciousness On examination between attacks he had slight weakness of the right grip, some incoordination of movement on the right side, a positive Romberg sign, and a tendency to adduct the right leg when walking

At craniotomy on February 25th, 1947, a fronto-parietal flap was made on the left side The posterior portion of the dura was adherent and yellowish-white masses of 2.5 mm were seen on the underlying convolution These were resected and *S japonicum* ova were found as in the previous case The patient was aphasic after the operation but recovered slowly He was given a course of stibophen starting on March 19th and by May 20th he was free of all neurological signs

Dr G M SAUNDERS, in a personal communication to the authors, reported two similar cases in which neurological localizing signs developed and craniotomy was performed, in one case with complete relief of symptoms, in the other with only partial Stibophen was also given when schistosome ova were demonstrated in the biopsy

In a discussion, in which the authors describe the life cycle of the worm, they note that cerebral complications are more common in the third stage of the disease than earlier Quoting CARROLL (*loc cit*) they state that the symptoms are usually somewhat different at the two stages Within the first 6 months of infection, there is usually drowsiness followed by coma and incontinence There may be signs of pyramidal tract involvement with weakness, spasticity, exaggerated reflexes, an extensor Babinski's sign, a high eosinophilia, and fever The symptoms tend to subside with the cessation of fever On the other hand, in the third stage, Jacksonian convulsions and hemiplegia are more common

The authors point out that patients with cerebral schistosomiasis very frequently give no history suggesting the early manifestations of the disease and the diagnosis is often dependent on the biopsy findings They consider that craniotomy is indicated as well as medicinal treatment, stibophen for preference

L E Napier

GHAREEB A A Cancer of the Body and Tail of the Pancreas with Bilharziasis
J Roy Egyptian Med Ass 1941 July, v 24, No 7, 311-20, 2 figs [12 refs]
[Recd 13 Dec 1948]

Report of a case

WOOD, E A Cough following Intravenous Tartar Emetic *J Roy Egyptian Med Ass* 1943, Feb, v 26, No 2, 54-64 [Recd 13 Dec 1948]

ASHKAR The Effect of Tartar Emetic Treatment on the Liver and its relation to Jaundice *J Roy Egyptian Med Ass* 1944, Aug v 27, No 8, 391-9 1 graph [10 refs] [Recd 13 Dec 1948]

of treatment in some of the cases referred to ova obtained by rectal biopsy several months after treatment, were found to be still viable, clearly the treatment had been ineffectual.

H. HAROLD S. &

GELFAND M. & ROSS, W. F. The Diagnosis of Schistosomiasis by Rectal and Vesical Snips based on 150 Autopsies. *J Trop Med & Hyg* 1949 Jan. v 52, No 1 12-15

In S. Rhodesia MEXNER ROSS & BLAIR [this Bulletin 1948, v 43 791] have shown the superiority of rectal biopsy over the use of Weller's scraper in the diagnosis of rectal schistosomiasis. GELFAND [this Bulletin 1949 v 40 56] has demonstrated, post mortem, the efficacy of the examination of snips from the bladder in the diagnosis of *S. haematobium* infestations. In the present paper the diagnostic value of examination (post mortem) of snips from the bladder and from the rectum is further demonstrated. The conclusion is reached that biopsy from the bladder or rectum is warranted in clinical practice to establish a diagnosis of schistosomiasis. The authors supply the following summary —

- (1) A comparative study is made of 150 cases of schistosomiasis in which bladders and rectums were removed at post-mortem, snips being taken from these organs prior to their digestion in caustic potash.
- (2) The bladder snips were positive for *S. haematobium* in 80 per cent. of known cases of *S. haematobium* infection and the rectal snips were positive for *S. muroni* in 52 per cent. of known cases of *S. muroni* infection.
- (3) *S. haematobium* infection was diagnosed by rectal snip in 60 per cent. of cases.
- (4) These results confirm the value of vesical snips in the recognition of *S. haematobium* in bladder infestations and also the relative frequency in which *S. haematobium* infections may be recognised by rectal snips.
- (5) The results also confirm our previous experience that pure *S. muroni* infections are extremely uncommon in South Central Africa.

A. R. D. ADAMS

CHANG T. H., SMITH G. W., RIESSENMAN P. R. & ALSTON E. F. Cerebral Granuloma due to Schistosomiasis. *J Amer Med Ass* 1948, Jan. 1 v 138 No. 4 230-38 7 figs. [Ref. in footnotes.]

The authors were able to collect references to 23 cases of cerebral schistosomiasis prior to 1946 from 1946 onwards 15 additional cases including 4 by CARROLL [this Bulletin 1946 v 43 1047] and 6 by TILLYMAN [ibid 1947 v 44 600] have been reported. Of these 38 cases, in 29 the diagnosis was presumptive, on clinical evidence combined with pathological bowel findings, in 5 it depended on biopsy findings and in 3 on autopsy. In 3 cases *Schistosoma haematobium* was the parasite concerned and in 33 *S. japonicum*. In no case were *S. muroni* eggs found in the brain.

The authors report two further cases —

Case 1—An ex-service man aged 26 who had been on Leyl was seen on August 13th, 1943 with weakness of right arm and leg, dysphagia, blurring of vision, weakness of the right facial nerve and a low-grade fever all of a few days duration. By September 7th the weakness of the limbs had improved slightly but he was suffering from severe headaches. Hyperaesthesia and hyperreflexia were noted. He had a 1 per cent eosinophilia. By April 1946 there was further improvement in the paresis and hyperaesthesia, but the patient had developed complete motor aphasia. A craniotomy was

performed on April 12th. The dura was adherent to the posterior portion of the third middle frontal convolution and on the surface of the inferior frontal convolution a number of nodules, from pin-point to 2 mm in diameter, were observed. Biopsy showed *S japonicum* ova. There was immediately some improvement and this continued after three courses of stibophen (of 14 injections each with 5 ml as the maximum dose), however, he had several Jacksonian fits. By May 20th 1947, the only residue was minimal aphasia. No schistosome ova were found elsewhere in this patient.

Case 2—An ex-service man, aged 22, with service in Leyte, gave a history of attacks of unconsciousness with left-sided twitchings, preceded by numbness of the left knee and headaches. He was first seen on December 22nd, 1946. The subsequent seizures all involved the right side and he did not lose consciousness. On examination between attacks he had slight weakness of the right grip, some incoordination of movement on the right side, a positive Romberg sign, and a tendency to adduct the right leg when walking.

At craniotomy on February 25th, 1947, a fronto-parietal flap was made on the left side. The posterior portion of the dura was adherent and yellowish-white masses of 2.5 mm were seen on the underlying convolution. These were resected and *S japonicum* ova were found as in the previous case. The patient was aphasic after the operation but recovered slowly. He was given a course of stibophen starting on March 19th and by May 20th he was free of all neurological signs.

Dr G. M. SAUNDERS, in a personal communication to the authors, reported two similar cases in which neurological localizing signs developed and craniotomy was performed, in one case with complete relief of symptoms, in the other with only partial. Stibophen was also given when schistosome ova were demonstrated in the biopsy.

In a discussion, in which the authors describe the life cycle of the worm, they note that cerebral complications are more common in the third stage of the disease than earlier. Quoting CARROLL (*loc cit*) they state that the symptoms are usually somewhat different at the two stages. Within the first 6 months of infection, there is usually drowsiness followed by coma and incontinence. There may be signs of pyramidal tract involvement with weakness, spasticity, exaggerated reflexes, an extensor Babinski's sign, a high eosinophilia, and fever. The symptoms tend to subside with the cessation of fever. On the other hand, in the third stage, Jacksonian convulsions and hemiplegia are more common.

The authors point out that patients with cerebral schistosomiasis very frequently give no history suggesting the early manifestations of the disease and the diagnosis is often dependent on the biopsy findings. They consider that craniotomy is indicated as well as medicinal treatment, stibophen for preference.

L. E. Napier

GHAREEB, A. A. Cancer of the Body and Tail of the Pancreas with Bilharziasis. *J. Roy. Egyptian Med. Ass.* 1941, July, v 24, No 7, 311-20, 2 figs. [12 refs.] [Recd. 13 Dec. 1948.]

Report of a case

WOOD, E. A. Cough following Intravenous Tartar Emetic. *J. Roy. Egyptian Med. Ass.* 1943, Feb., v 26, No 2, 54-64. [Recd. 13 Dec., 1948.]

ASHKAR. The Effect of Tartar Emetic Treatment on the Liver and its relation to Jaundice. *J. Roy. Egyptian Med. Ass.* 1944, Aug., v 27, No 8, 391-9, 1 graph. [10 refs.] [Recd. 13 Dec., 1948.]

HALAWANI, A. On Fantorin in the Treatment of Schistosomiasis. *J. Roy Egyptian Med Ass* 1941 July v 24 No 7 347-7 [Recd. 13 Dec 1941]

1 Fantorin is apparently similar in its chemical composition to Foscyl.

2. 39 cases were treated with Fantorin as described in the text. Thirty nine cases were apparently cured after completing their course. One case proved refractory to treatment with Tartar Emet. and Fantorin.

3 According to our observations the effect of Fantorin on the course of the disease is favourable and no serious symptoms have been produced by it.

WATSON, J. M., ABDEL AZIZ, M. & HALAWANI, A. Investigations on Miracidia (Miracidia) and its Effect on Human Bilharziasis. 70 pp., 2 graphs. [23 refs. 1941. Cairo Ministry of Public Health.

For abstract of this work, see this *Bull.* 1943 v 43, 1018.

KHALLIL Bey M & HILMY I. S. Report on the Progress of the Eradication of Bilharzia from Yeftebe Wadi Kem-Ornbo, Egypt. *J. Roy Egyptian Med Ass* 1942, Sept.-Oct. 23, Nos. 9-10 264-99 3 graphs [Recd. 13 Dec 1942]

GÁLVEZ FERNÁN, N. Fasciolosis del Córdoba. (Reporte de un caso operado.) (Fasciolosis of the Rio-Dart. Report on a Case treated by Operation. *Rev. Asoc. Med. Trop. y Parasit.* 1943, Sept.-Oct., 4 Nos. 9-10, 191-2, 1 fig.

CALVO FOSSE, R. Hallazgo de Blastocysts humanos y quistes de *Echinococcus* asociados a *Fasciola hepatica* en biles obtenidas por paracentesis abdominal. (Nota clinica.) (Detection of Blastocysts humanis and Cysts of *Echinococcus* associated with *Fasciola hepatica* in Bile obtained by Dorsal Intubation.) *Rev. Asoc. Med. Trop. y Parasit.* 1943 Sept.-Oct. 4 Nos. 9-10 193-4

JOYEUX, C. Les phénomènes d'immunité dans les hélmintoses considérés chez les cestodes de l'homme. (Immunological Problems in Helminthosis Infections with special reference to Cestode Infections in Man. *Med. Trop. Marseille*, 1943, July-Aug. Sept.-Oct. 8 No. 4 463-70 [77 refs.]

Joyeux discusses various aspects of natural immunity and acquired immunity in relation to helminth infections in general and then considers these phenomena in certain cestodes of medical interest. They are discussed under the headings, large and small cestodes in the light of a previous suggestion that the size of helminths may be a factor in determining the saturation point in helminth infections. In other words the protection given to a host against acquiring an unlimited number of helminths owing to continuous exposure to infection.

Large cestodes.—Premunition is especially evident in the case of *Taenia saginata* and *T. solium* in which infections with a single worm are the general rule though on rare occasions multiple parasitism has been observed. In one case of the latter kind, the worms were reduced in size and the number of segments was less than normal. *Diphyllobothrium latum* differs from the Taenid cestodes in that it is not restricted to the human host and commonly occurs as a multiple infection. Moreover there is some evidence that this worm induces an immunity of kind more resembling true acquired immunity than preunition. In infestation with the related non-human pseudophyllid *D. crassum* and *Ligula intestinalis* preunition is absent in the former but present in the latter. It is concluded that zoological affinities are unconnected with protection phenomena in the cases cited.

Small cestodes—It is known that mice are protected by the first infection with *Hymenolepis nana fraterna*, from subsequent infections with this species, but the human form of this parasite, *H. nana*, apparently induces no such response in the human host, judging from the enormous numbers of worms which have been found and which must have been acquired in successive infections. It is suggested that the difference in the volume of the human intestine from that of the rodent may be a contributory factor, and this recalls the idea of a "saturation point" previously postulated. *H. diminuta* occurs in the intestine of rats in fair numbers but premunition has been demonstrated in this infection, so that it is necessary to invoke the probability of a simultaneous ingestion of a number of larval stages, this is facilitated by the fact that the intermediate host often harbours several larvae.

In conclusion, the author sums up that in addition to natural immunity ("spécificité parasitaire"), premunition and acquired immunity are represented in certain helminthic infections, but the manifestations of the latter are sometimes inexplicable and do not conform to bacteriological conceptions of immunity.

J J C Buckley

OBRADOR, S. Clinical Aspects of Cerebral Cysticercosis. *Arch Neurology & Psychiatry* 1948, Apr, v 59, No 4, 457-68

Cerebral cysticercosis is common in Latin America. In Mexico ROBBS reported 25 cases in a series of 100 cases of cerebral tumour and in Chile, ARANA and ASENJO [this *Bulletin*, 1945, v 42, 908] reported 25 in a series of 202 cases of intracranial tumour. The author collected 17 cases during 5 years of neurosurgery in Mexico, of these 10 were confirmed at autopsy.

Cerebral cysticercosis can be classified as follows—

- 1 Cortical
- 2 Ventricular (a) Isolated, (b) Multiple
- 3 Basilar Predominantly in (a) region of the cisterna magna, (b) cerebello-pontine angle, (c) anterior and middle fossae
- 4 Mixed general and diffuse

The main symptoms of cerebral cysticercosis fell into four groups, epileptiform attacks, signs of increased intracranial pressure, mental disturbances, and loss of vision, according to the localization of the cysticerci. There is often pronounced cortical atrophy, this and other observations make the author consider the possibility of some "toxic" action of the cysticerci.

The course of the disease is sometimes rapid, especially in children, with "fever, headaches, convulsions, vomiting and other acute and generalized neurologic signs." Or it may be irregular with intervals as long as 20 years between the appearance of different signs. More characteristically there are irregular and diverse neurological symptoms of a slowly progressive nature.

X-ray study of the skull gives both non-specific evidence, mainly evidence of increased pressure, and specific evidence, multiple diffuse calcifications. These were observed in one-third of the author's cases. Rarely, the cysts produce erosions of the bone. Encephalograms and ventriculograms may contribute to the diagnosis. e.g. hydrocephalus associated with cerebral atrophy is fairly typical of cysticercosis. Contributory evidence may be obtained by the demonstration of calcified cysticerci in other parts of the body.

Contrary to the experience of the British school, the author has found valuable evidence from the cerebrospinal fluid. [In a footnote it is stated that the section on the cerebrospinal fluid was written by Dr D NIETO from all his own 27 cases.]

The non-specific changes in 27 cases consisted of an increase in the cellular count 15 to 100 per cmm with eosinophils varying from 0.5 to 33.0 per cent,

an increase in total protein up to but rarely above 100 mgm. per 100 ml. an increase in globulin and a decrease in the glucose content to below 50 mgm. per 100 ml. The Wassermann reaction was negative.

The specific indication is given by the complement fixation test with an alcoholic extract of cysticerci from the pig. The reaction is done on the same lines as the Wassermann reaction and in the author's 27 cases 2 were positive with 1 ml. 10 with 0.5 ml. and 15 with 0.2 ml. (The contrast between British experience, of cysticerci of Asiatic origin and the Latin American experience suggests that either the latter are not reporting the milder cases of cysticercal epilepsy so commonly encountered here or we are failing to diagnose very severe cases with signs of cerebral tumour or with predominantly psychotic symptoms. The milder epilepsy cases would not of course come into the hands of neurosurgeons. On the other hand it is possible that we are not paying enough attention to the cerebrospinal fluid in suspected cases.)

L. E. N. S. W.

RODRIGUEZ LÓPEZ VETRA, C. Bibliografía Egiptológica Ibérica. A Spanish and Portuguese Bibliography of Hydatid Infection. *Archivos Internos de la Hidatidosis* Montevideo, 1947 Dec. v 7 No. 1/2, 131-4.

ARANA IRAGUIER, R., GARCIA CAPRERO, R. & CAU ARRIETA, N. L. Hidatidosis vertebral. A propósito de un caso diagnosticado precozmente. [Vertebral Hydatid. Early Diagnosis of a Case.] *Archivos Internos de la Hidatidosis* Montevideo, 1947 Dec., v 7 No. 1/2, 43-55 7 figs. [12 refs.]

SCHROEDER, A. Diagnóstico do quiste hidático cerebral. [Diagnosis of Cerebral Hydatid Cyst.] *Archivos Internos de la Hidatidosis* Montevideo 1947 Dec., v 7 No. 1/2, 195-216, 9 figs & pls. [31 refs.]

A full discussion.

SCHLANGER, P. M. & SCHLANGER, Henriette. Hydatid Disease and its Roentgen Picture. *Amer. J. Roentgenol. & Rad. Diag. Therap.* 1948 Sept., v 60 No 3 331-47 46 figs. [41 refs.]

To obtain the full value from this paper it will be necessary to refer to it in the original, since there are 48 excellent diagrams around which the paper is written. The authors have studied 130 cases of hydatid disease and they have added diagrams from Professor B. N. Calcagno's series of 350 cases.

The order of frequency of the localization of primary hydatid cysts is the liver (55 to 65 per cent.) the lung (17 to 24 per cent.) the bones the kidney and the spleen but practically any organ may be involved.

The liver cyst is the only one that is frequently calcified. Calcification does not indicate the death of the *Echinococcus* nor does it preclude infection at a later date but the authors have never seen a calcified cyst enlarging. The X-ray appearance may be that of a completely calcified round or oval mass or of a rounded reticulated shadow with or without a sharply defined segment of a circle at one part of the periphery. The liver is always enlarged, the right side of the diaphragm is raised, often divided into two arches, and its movement is limited. Cysts bulging from the lower surface of the liver often show a crescentic-like displacement of the barium-filled hollow viscera. Infected cysts usually show a fluid level. Ruptured cysts give a variety of appearances according to whether they have ruptured into the bronchial tree (reactive pneumonia) into the duodenum via the biliary duct directly into the digestive tract (reflux of barium into the cyst cavity) into the peritoneum, or through the skin.

Cysts occurred in the lungs in 22 per cent of the authors' cases. They were usually of considerable size and caused a bulging of the thoracic cage, but no erosion of the ribs is seen in extra-pulmonary cysts. They often lose their round shape and become polycystic. They do not usually calcify. Diagnosis is best made by a bronchogram, the bronchi and bronchioles appear as the fingers of a hand grasping the tumour, and the smallest bronchioles may be obstructed and end in a point. Rupture can sometimes be foretold by the appearance of pericystic emphysema. Clinically this is associated with slight haemoptyses.

There were 4 cases of bone hydatid in the authors' series and 30 in Professor Calcagno's. The bone is "blown up and riddled with cavities", there is no reparative reaction in the bone. Cysts of the spleen and kidney are difficult to differentiate clinically, but can usually be diagnosed by X-rays. Sometimes they are calcified. Cysts of the abdominal cavity are usually secondary to a ruptured liver cyst. The rupture may easily escape diagnosis at the time. After an interval, multiple cysts develop. Clinically the abdomen feels like a sack of potatoes and X-rays show innumerable "rounded shadows of the same density as the kidney".

L E Napier

PRAT, D. Complicaciones y secuelas del quiste hidático. Es la hidatidosis una afección benigna como se le ha considerado hasta hace poco? [Complications and Sequelae of Hydatidosis. Is this so Benign an Affection as it has been regarded until recently?] *Archivos Internac de la Hidatidosis* Montevideo 1947, Dec, v 7, Nos 1/2, 15-26, 5 figs

Though this article contains little, if anything, really new, it will serve a useful purpose if only it succeeds in impressing upon Uruguayan people in general that hydatids are not the benign, almost negligible, infestation to which they have paid but scant attention. The author quotes cases and gives illustrations of specimens from autopsies in which a neglected hydatid of the liver, for example, has led to an obstinate, even permanent, fistula or to rupture into the lung which could only be cured by the dangerous operation of lobectomy.

H Harold Scott

HALAWANI, A, NOR-EL-DIN G & SHAKER M. An Investigation of a Localised Epidemic of Acute Hookworm Disease. *J Roy Egyptian Med Ass* 1944, Aug, v 27 No 8 294-302 [11 refs] [Recd 13 Dec, 1948]

KYLE L H, MCKAY, D G & SPARLING, H J, Jr. Strongyloidiasis. *Ann Intern Med* 1948, Dec, v 29, No 6, 1014-42, 9 figs [52 refs]

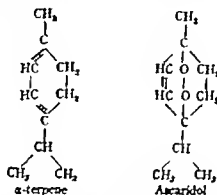
A fatal case of *Strongyloides stercoralis* is presented. The filariform larvae were found in the usual locations and in addition were found in the myocardium, lungs, trachea, liver and gall-bladder.

The clinical manifestations of this infection are variable but in general they include abdominal pain, alternate diarrhoea and constipation, cough, dyspnea and hemoptysis.

Treatment with various drugs produces variable results. The best treatment to date is probably found in the use of gentian violet, given orally at first. If the infection is not cured by oral administration, intraduodenal and possibly intravenous administration should be tried.

SCHNECK G O & SCHULZE BUSCHOFF H. Synthetisches Ascaridol, eine neue Möglichkeit der Spulwurmbehandlung. [Synthetic Ascaridol in the Treatment of Ascaris Infestation.] *Deut med Woch* 1948 Aug 13 v 73 Nos. 29/32, 344-4 1 fig. [10 refs.]

Though ascaridol was isolated many years ago as an active principle of oil of chenopodium, constituting as much as 60 and even 80 per cent. of a good sample attempts to synthesize it have until recently met with no success. Now this has been done by the catalytic action of chlorophyll on α -terpenes in the presence of light resulting in the incorporation of oxygen as shown in the accompanying formula



The product is found both chemically and physically to be identical with the natural one. The relative toxicities were tested on mice and were found to be almost the same: the minimal lethal dose of the natural product being 0.157 gm./1000 gm. mouse and the absolute lethal dose 0.1 gm., whereas the relative amounts of Schneck's synthetic product were 0.16 and 0.2 gm. Tested on *Taenias* both the two were equally vermifugal.

Twenty-five human cases, all in adults whose ages ranged between 15 and 60 years are recorded (in tabular form) of its use in the following way: A castor oil or saline purgative in the evening; the next morning two capsules each containing 0.2 gm. of the ascaridol were given at 8 a.m. and a third at 8.30 a.m., 0.6 gm. in all. Breakfast at 10 a.m. consisting largely of vegetables and at 11 a.m. a castor oil purge. On the three succeeding days a dose of Carlsbad salts is given. One man of 42 years, expelled 496 ascarides and all appeared to be dead. The dosage for children is set down as: 3-year-old 0.1 gm., 3-4 years 0.2 gm., 5-6 years 0.3 gm. and 6-12 years 0.45 gm. These are the total dosages. In many cases a follow-up reveals no more passing of ova, but it is advised that if the treatment needs to be repeated an interval of 14 days should be allowed to elapse. No untoward side-effects have been reported or observed.

H. Harold Scott

SCHUBERT R. Erfahrungen mit dem synthetischen Ascaridol Schneck. [Experiences with Synthetic Ascaridol "Schneck." *Deut med Woch* 1948 Aug. 13 v 73 Nos. 29/32, 344-5]

This author has tried the synthetic ascaridol prepared by Schneck on 35 patients with ascariasis. He reports very little success on his first trial: in six only were ova seen after the treatment and these cleared finally though oil of chenopodium had been given without effect previously. One patient had to have a second course of treatment.

H. Harold Scott

OLIVER-GONZALEZ, J, SANTIAGO-STEVENSON, D & HEWITT, R I Treatment of Six Cases of Ascariasis in Man with 1-Dioethyl-Carbamyl-4-Methylpiperazine Hydrochloride *Southern Med J* 1949, Jan, v 42, No 1, 65-6

"Six patients infected with *Ascaris lumbricoides* were treated with 1-dioethyl-carbamyl-4-methyl-piperazine hydrochloride ('hetrazan'), at 2 mg per kg given three times during a twenty-four-hour period at eight-hour intervals. All worms were apparently removed from three patients. The majority of worms were removed from the remaining three patients, as demonstrated by egg count reductions after treatment of 83.4, 91.3 and 99.5 per cent, respectively. Living worms were passed in all cases. The compound produced no toxic effects in the doses used."

RABEE, A A Abdominal Section for Intestinal Obstruction due to 2005 *Ascaris* Worms *J Roy Egyptian Med Ass* 1943 Sept v 26, No 9 325-6 [Recd 13 Dec, 1948]

Report of a case

BRUMPT, E Filarioses et éléphantiasis [Filariasis and Elephantiasis] *Liber Jubilaris J Rodhain (Soc Belge Med Trop, Brussels)* 1947, Dec, 103-20

To explain the absence or rarity of microfilariae in patients suffering from elephantiasis, it would be necessary (i) to accept Manson's view that the recurrent attacks of fever had killed the adult filariae this is not very probable because, among healthy carriers, the worms persist in spite of more or less frequent attacks of fever, due for example to malaria, or (ii) to put forward the hypothesis that there is an antagonism in individuals between the conditions favourable for the evolution of the filariae and the development of elephantiasis. Now, such an antagonism would be curious since it would mean that, among a whole population of carriers of microfilariae, only those suffering from elephantiasis had any natural immunity against filariae or (iii) that a large percentage of sufferers from elephantiasis have acquired over a long period an active sterilizing immunity this prevents the evolution of millions of infective larvae by which they are inoculated in the highly endemic areas where 25-30 per cent of vector mosquitoes are infected.

However, from all the epidemiological observations of *W bancrofti*, we can conclude with certainty that elephantiasis is due to this filaria, the geographical distribution being the same. The association of bacteria for the production of elephantiasis is unnecessary.

All the research concerning *W malayi* shows a striking parallel between the incidence and abundance of microfilariae in a given population and the number of cases of elephantiasis. The aetiological rôle of this filaria is therefore well established.

Recent experience among American troops in the endemic areas in the Pacific indicates that the rôle of "*W pacifica*" as the cause of elephantiasis, whether it is a separate species or a geographical race of *W bancrofti*, cannot be doubted.

On the subject of the pathogenesis of the lesions produced by *Onchocerca volvulus*, it is not possible to bring definite evidence as to whether they are caused by mechanical action or a toxin. It is difficult to attribute to the microfilariae of this parasite, which are found in small numbers in the lymphatic glands, any more than one does to those of *W bancrofti* a rôle of blocking the

blood vessels. On the other hand if one allows a toxic rôle to this parasite it is difficult to account for the fact that only a small percentage of cases show lesions further microfilariæ may be found in the conjunctiva without causing any interference with vision. One must conclude that either some persons are particularly susceptible or that some strains of *O. rostralis* are particularly pathogenic.

L. E. V. per

ZANETTI, V. Traitement de certains phénomènes allergiques d'origine filarienne par auto-allergène urinaire. [The Treatment of certain Allergic Phenomena of Filarial Origin with Auto-Allergens from the Urine.] *Soc. Bole. de Méd. Trop.* 1943 June 30, v. 28 No. 2, 237-62.

Cutaneous allergic manifestations oedema, pruritus, urticaria and lichenification and thickening of the skin are mainly associated with *Onchocerca rostralis* infection but may occur with *Loa loa*. They occur mainly in Europeans who have been repeatedly subjected to infection over long periods and they can be extremely troublesome. The pruritus is sometimes unrelenting and interferes with sleep. This results in violent scratching with subsequent secondary infection.

The author decided to try inoculation by auto-allergens obtained from the urine of the patient. The allergens were prepared by the method of BARRIS and ORIEL (*Brit. Encyclopaedia of Med. Pract.*, v. 3) 229.

At first he had doubtful results but he obtained a very good result in a non-filarial patient allergic to insect bites, with very small doses of allergen. This made him realize that previously he had used too large doses.

He subsequently adopted the technique of giving four test doses into the skin of the anterior surface of the forearm, in strength of 1 in 1,000, 1 in 10,000, 1 in 100,000 and 1 in 1,000,000 sufficient to produce a wheal of 7 mm. in diameter. The results were read in 24 to 48 hours. Round raised reddish papules of 4 mm. in diameter were produced which disappeared after another day or two. Dilutions of 1 in 100,000 were uniformly positive and 1 in 1,000,000 were doubtful.

The treatment consisted of 10 subcutaneous injections, 1.03 ml. 1 in 1,000,000 dilution once a week. Improvement commenced after the first injection and continued. The desensitization usually lasted six months or so but another injection re-established it. In the pruriginous forms there was sometimes a slight exacerbation after 36 hours preceding the improvement. The author adopted the above dosage as a standard often without preliminary testing. With larger doses there was frequently an oedematous reaction.

L. E. V. per

ALVAREZ CRISTO, J. *Dracofilaria immitis*. Investigación en perros de la ciudad de Guayaquil. [*Dracofilaria immitis*. Investigation of Dogs in the City of Guayaquil.] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil 1944 Apr. 1, v. 1 No. 1, 199-202, 1 fig. English summary.

HAWKING, F. & SEWELL, P. The Maintenance of a Filarial Infection (*Leishmanoides cavia*) for Chemotherapeutic Investigations. *Brit. J. Pharmacol. & Chemotherapy* 1948, Dec. v. 3 No. 4, 283-86, 4 figs. on 7 pl. 31 refs.]

Cotton rats naturally infected with the filarial worm *Leishmanoides cavia* have been used by CHLAKOVSKY and colleagues in testing possible chemotherapeutic agent in this infection. [this Bulletin 1944 41 7-9 1945]

v 42, 136] WILLIAMS and collaborators successfully transmitted *L. carini* to cotton rats and white rats by the tropical rat mite *Liponyssius bacoti* and described the method of rearing the vector in the laboratory, and also made important observations on the life cycle of the filarial worm *L. carini* [*ibid*, 1946, v 43, 663, 1080, 1948, v 45, 629] SCOTT and his colleagues infected cotton rats and white rats with the same filarial parasite through contact of clean animals with cotton rats already infected, and made important observations on the rate of growth and maturity of *L. carini*. Later that author described the production of quantitative filarial infections in the cotton rat with much technical detail so that accurate chemotherapeutic studies became possible [*Amer J Trop Med*, 1946, v 26, 849, this *Bulletin*, 1947, v 44, 447, 839, 840]. In Britain, BERTRAM and colleagues have also made useful contributions on the same subject [*ibid*, 1946, v 43, 1197]. The experiments described by the present authors owe much to the generosity of American workers for demonstrating their methods and providing infective material. Mites were bred on sawdust in jam jars kept in an insectary with a day-old rat or mouse to feed on. The mites were then transmitted in the sawdust to sterile tanks and allowed to feed on infected cotton rats with microfilariae in their blood. Fresh young cotton rats were then introduced to the tanks for the infected mites to feed on after removal of the infected animals. About 8 weeks later, a drop of tail blood was examined, after staining, for the presence of microfilariae. Adult worms are found in the pleural cavity and mediastinum after a time, but may be absent, suggesting that spontaneous cure has occurred. The cotton rat nevertheless appears, from the literature, to be the best experimental animal available. To estimate the value of chemotherapeutic agents, examination of adult worms and microfilariae should be made since various classes of drugs affect the different developmental stages of the worm in different ways. It appeared that six daily doses of drug given intraperitoneally was a suitable method of treatment. Six days after the last dose, the rat was killed and examined for adult forms and microfilariae. The activity of antimonials and arsenicals in this infection, as described by other authors, was confirmed.

J D Fulton

WANSON M. Notes sur le comportement de *S. albivirgatum* Wanson et Henrard [A Note on *Simulium albivirgatum* Wanson and Henrard] *Ann Soc Belge de Med Trop* 1948, June 30, v 28, No 2, 279-85

Simulium albivirgatum is widely distributed in the Belgian Congo, coming third in frequency and distribution after *S. damnosum* and *S. griseicollis*. It attacks animals, birds and man. Some notes are given on its habits and a table shows the monthly collections for 1946 and 1947. Numbers are highest for the dry months June to September and lowest in the wet months. This species attacks the lower parts of the body, not usually higher than the knee of a standing man.

At Léopoldville, 0.53 per cent of captured female *S. albivirgatum* were found to contain 'sausage forms' of *Onchocerca volvulus*. In 6,000 dissections no further development was observed. In the laboratory 362 females were reared and fed on infected volunteers. A number of these flies were killed, dissected and examined daily for nine days, and the natural findings were confirmed. No larvae of *O. volvulus* were seen in the head or mouthparts and the development in body cavity or thoracic muscles did not proceed beyond the 'sausage stage'.

H S Leeson

See also p 404, LEWIS, The Simuliidae of the Anglo-Egyptian Sudan

BASCHCEV, J. C. Trichocephalosis y arsenicos organicos pentavalentes. [Trichocephalosis and Arsenical Compounds.] *Rev. A. de Med. Trop. y Parasit.* 1943 Sept.-Oct., v 4 No. 9 10 185-8.

The English summary appended to the paper is as follows:—

"The author reports on the action of Arsenical compound on *Trichocephalus* trichuris.

Five cases of Trichocephalosis were treated with Acetamidobenzoyl-xybenzyl-carbonic-acid mixed with sodium carbonate (Content of a tablet Arsenic 0.25 Gm., Carbonate 0.15 Gm. Dose Up to 123 Pils., 0.008 Gm. for each pound of weight for 10 days).

Administering 4-carbamino-phenyl-carbonic acid also mixed with sodium carbonate (Arsenic 0.25 Gm. Carbonate 0.15 Gm.) the author treating 14 cases reports a 64% cure.

DEL CAMPO VÁSQUEZ, M. & MALHOTRA, L. Incidencia de triquinosis en gatos de la ciudad de México. [Trichinosis in Cats in Mexico City.] *Rev. Inst. Salubridad y E. enfermedades Trop. México* 1943, Ma. v 9 No. 1 31-4.

The English summary appended to this paper is published in the *Bulletin of Hygiene* 1943, v 23, 85A.

GRUBER, O. F. Effects of Digestion and Refrigeration on the Ability of *Trichinella spiralis* to Infect Rats. *J. Parasitology* 1943, Oct., v 34 No 3 304-5.

The effects of digesting *Trichinella* cysts for periods of 4, 8 and 12 hours in a solution of 1 per cent. pepsin and 0.5 per cent. hydrochloric acid (pH 2.0) together with varying periods of refrigeration at 5°C. were tested in relation to the subsequent infectivity of the larvae. One series of 12 rats was fed with 3,000 larvae per rat and a second series of 12 rats with 3,000 larvae per rat. Each rat was killed 24 hours after the infective feed and the larvae recovered from the intestine were counted. The results indicate that the infectivity of the larvae was not impaired by 4 to 8 hours of digestion nor by 24 hours of refrigeration but 12 hours of digestion resulted in a lowering of the percentage of worms recovered. Larvae exposed to 72 hours of refrigeration, however, showed a much reduced recovery rate even in combination with only a few hours of digestion.

J. C. Buckley

DEFICIENCY DISEASES

CORKILL, V. L. The Poisonous Wild Cluster Yam, *Dioscorea d. nutans* Pax, as a Famine Food in the Anglo-Egyptian Sudan. *Ann. T. of Med. & Parasit.* 1943, Dec. 4th No. 34 278-87 pl. & map 17 refs.

"1. Following a locust visitation which destroyed much of the crops in the Fung area of the Sudan in 1939 some 12 wild tubers and roots were widely used as food.

"2. The most important was the cluster yam *Dioscorea dumetorum* Pax, presumed to contain the alkaloid dioscorine.

3. Cases of poisoning resulted from its use as a food although most communities soon evolved methods of detoxication.

"4. The yam was usually prepared either as a cooked whole vegetable or flour for making cakes, or as a porridge. Beer was also made from it.

" 5 Its nutritive value was mainly as a calorie food, but it also contributed most protein to the famine diet, and seems to have been the main antiscorbutic food, being thus analogous to the potato in parts of Ireland

" 6 Two closely related forms from Asia are referred to "

VELEZ BOZA, F. La alimentación y la nutrición en Venezuela [Food and Nutrition in Venezuela] *Rev Sanidad y Asistencia Social* Caracas 1948, Jan-Apr, v 13, Nos 1/2, 1-183, 22 pls, 8 charts & 2 maps English summary

KOENIGSFELD, E. G. H. & DESAI, V. G. Corneal Opacities among Children of a Railway Colony in the Dekkan *Indian Med Gaz* 1948, Aug, v 83, No 8, 383-7

Corneal opacities, affecting one or both eyes, were found in 20 (2.6 per cent) of 761 children examined. Fifteen of the twenty cases showed wasting and anaemia. No other signs of nutrition deficiency are recorded. Evidence of trachoma was present in only a small number of cases.

The authors conclude that malnutrition is the main aetiological factor, but are unable to incriminate any specific factors. *Dean A. Smith*

RAMALINGASWAMI, V. Nutritional Diarrhoea due to Vitamin A Deficiency *Indian J Med Sci* 1948, Nov, v 2, No 11, 665-74 [26 refs]

It is well known, particularly from animal experiments, that keratinizing metaplasia associated with vitamin A deficiency affects many epithelial structures. While ocular and dermal lesions have received much attention, diarrhoea as a manifestation of human vitamin A deficiency has seldom been recorded.

Twenty children with keratomalacia or Bitots' spots, skin changes, low plasma vitamin A levels and diarrhoea were treated with vitamin A concentrate. The diarrhoea was controlled within 48 hours on this treatment alone and as there was no evidence of infection nor of other nutritional deficiency (except possibly protein) it is concluded that the diarrhoea was part of the avitaminosis A syndrome. *Dean A. Smith*

HAMMOUDA, M. & NAGI, M. The Use of Pyridoxine in the Treatment of Egyptian Pellagrins *Acta Tropica* Basle 1948, v 5, No 4, 357-9, 1 fig

Loss of muscular power is frequently found in pellagrins and, unlike the classical features of the pellagrin symptom complex, dermatitis and diarrhoea, is not greatly improved by treatment with nicotinic acid.

Seven pellagrins were tested, before and during treatment, by means of a spring ergometer and it was found that pyridoxine (vitamin B₆) in doses of 50 mgm daily, by the intravenous route, rapidly restored muscular power. [Several clinical signs such as angular stomatitis, once thought to be essential parts of the pellagra syndrome, are now known to be due to a commonly associated deficiency—in the instance quoted, ariboflavinosis. The present evidence suggests that loss of muscular power may come to be regarded in the same way as due to an associated pyridoxine deficiency.] *Dean A. Smith*

TROWELL, H. C. Medical Examination of 500 African Railway Workers *East African Med J* 1948, Nov, v 25, No 11, 423-32 [29 refs]

The author points out that in many nutritional surveys only clinical material is collected, there is usually no reference to pathological studies, and this may lead to serious mistakes.

The frequency and incidence of liver disease (especially cirrhosis) of chronic nephritis and of chronic pancreatitis are decreased. DAVIES (this Bulletin 1947, 44, 1098) in a review of nearly 3,000 autopsies at Kampala, Uganda, 11 livers being examined by himself considers that these lesions can be traced back to an acute attack of severe malnutrition (kwashiorkor) in childhood. The present author thinks that there is clinical support for the view that malnutrition at this age may lead to certain permanent and incurable defects while the chronic inflammation of liver and pancreas is apt to lead to carcinoma. This work however requires to be extended and confirmed, as the real point at issue is whether these chronic lesions are really the result of malnutrition. There has been no detailed study of the enlargement of the parotids, which clinically appears to be part of the syndrome. The cause of the acute lesion is still unknown and it is uncertain if this begins in the liver or as DAVIES suggests (this Bulletin 1948, 45, 633) in the pancreas.

Judged by physique and strength of the dynamometer pull, a large proportion of Africans come within the normal range seen in Europeans, but a fair number fall below the standards set by other members of their own tribe and it is thought that the available evidence suggests that the latter group represent the effects of disease and malnutrition rather than a normal variability. At autopsy a large proportion show abnormalities of the liver, pancreas and salivary and ductless glands. Clinically a number show such signs as soft, brown hair, cracked skin, enlarged parotids, gynecomastia and enlarged livers. Many of these signs appear to have originated in an acute attack of malnutrition in childhood, but it is considered that more exact test of renal, pancreatic and hepatic function must be devised.

On the whole ordinary diseases were uncommon among railway workers although the evidence suggests a high incidence of respiratory infections probably due to overcrowding in the quarters, such infections being the commonest cause of death and absence from work. It is thought that vitamin deficiency did not materially reduce efficiency. The sign of malnutrition as detected in the African soldier (KIRKWOOD, 1947 unpublished data) and in the railway worker do not suggest any recognized vitamin deficiency but rather that malignant malnutrition had persisted. This was supported by pathological studies and explains why many of the signs did not improve on the general army diet.

The author considers that in certain districts of Africa a fair proportion of the population suffer from varying degrees of malignant malnutrition, have a disease which is progressive and incurable and can never give efficient work even on a perfect diet. Further their descendants will be small and nutritionally handicapped, while there can be little progress until the cause and course of this condition is recognized.

(Is malignant malnutrition the main cause of the small birthrate found in many parts of Africa?) C. F. SHOOTER

SALCEDO J. Jr, CARRASCO E. O., JONES T. R. & VALDIVIA, R. C. Studies on Beriberi in an Endemic Sub-Tropical Area. *J. Nutrition* 1948, 1, 10, 36, No. 5, 541-77. 23 refs.)

Beriberi rank second only to pulmonary tuberculosis as a cause of death in the Philippines, has been claimed over 3,000 lives in 1947 with a mortality rate of 13% per 100,000. Highly milled rice is the staple.

An attempt is projected to reduce the beriberi incidence in an area of high endemicity by artificial enrichment of the entire rice supply. This paper records the findings of a preparatory clinical survey. In all 12,004 persons were examined among whom 1,500 cases of beriberi were encountered.

No significant difference in the incidence of beriberi between the urban and rural populations was found. The individuals were grouped by age and physiological state. The group incidence, in descending order of frequency, was "expectant mothers", "nursing mothers", "other adults", "infants" (0-2 years) and "children" (2-15 years). Although there was a relatively low incidence in infants, mortality in this group was extremely high.

Estimations of thiamin were carried out in a one-hour urinary excretion after a 12-hour fast. The mean excretion in beriberi subjects was somewhat lower than in 65 apparently normal subjects, but there was no correlation between "fasting hour" thiamin excretion and severity of clinical manifestations.

The dietary records of all the individuals surveyed were kept for a nine-day period. The majority of the beriberi cases fell into the groups showing low dietary thiamin calorie ratios. Investigation showed that 15 per cent of the subjects washed their rice 4 times before cooking, 55 per cent 3 times and 30 per cent twice, all rice washings were discarded by over 80 per cent of the subjects.

The survey will be repeated after a trial period, enriched rice will be used

Dean A Smith

SPRUE

SUAREZ, R M, PEREZ-SANTIAGO, E, RODRIGUEZ-MOLINA, R, TORREGROSA, M V & BENITEZ-GAUTIER, C. Response of Tropical Sprue to Synthetic Pteroyltriglutamic Acid (Teropterin). *Bol Asoc Med de Puerto Rico* 1948, Sept, v 40, No 9, 235-40

Five sprue patients in Porto Rico were treated with Teropterin (pteroyltriglutamic acid). Four received 10 mgm intramuscularly and one 20 mgm daily, and all five responded in a clinical and haematological sense. The reticulocyte response was maximal even in one who was 88 years of age. One whose sprue was complicated with severe schistosomiasis and pronounced splenomegaly showed definite clinical and haematological response to a daily dose of 20 mgm. No deleterious effects which could be attributed to the triglutamate were observed. A daily dose of 10 mgm Teropterin which is equivalent to 6.3 mgm of folic acid, intramuscularly, is probably adequate in the treatment of sprue.

P Manson-Bahr

1 SUAREZ, R M & SPIES, T D. The Effectiveness of Vitamin B₁₂ in the Treatment of Tropical Sprue. *Bol Asoc Med de Puerto Rico* 1948, Aug, v 40, No 8, 199-209 [11 refs]

11 SPIES, T D & SUAREZ, R M. Response of Tropical Sprue to Vitamin B₁₂. *Blood* 1948, Nov, v 3, No 11, 1213-20, 5 figs

1 Six patients in Porto Rico suffering from tropical sprue were treated with intramuscular injections of vitamin B₁₂. In the first, a single injection of 10 mgm was given. In the second a second injection of 20 mgm was administered seventeen days later and a third of 25 mgm twenty-six days later. In case 3, a similar dosage was employed. The 4th patient received a single dose of 20 mgm, the 5th one of 4 mgm and the 6th two 25 mgm doses at twenty days apart. One patient did not respond to a single dose of 10 mgm and one other who received 4 mgm showed only a minimal reticulocyte response.

These responses were much greater when supplemented with folic acid or vitamin B₁₂.

No definite conclusions as to dosage or spacing were arrived at.

ii This paper appears to refer to five of the patients described above.
P. *Mansam-Bahr*

HAMID A. Cases of Sprue treated by Laparotomy. *Indian Med Gaz.* 1949 Aug., v 83 No. 8, 374-6

The underlying idea of performing laparotomy was to observe the effect of localized peritonitis acting as a counter-irritant. As the cases were typical, no stool or blood examinations were done. They were not improving on the orthodox treatments but the effect of operation was dramatic. The diarrhoea ceased and the patients did not have any motions for three or four days, nor did they develop tympanites.

The laparotomy was performed by a lower median incision, the intestines were gently massaged and a drachm of ether was poured in before the abdomen was closed. No relapses have so far been reported. In each case the illness had persisted for five months to one year. Two cases were in women of 23 and 25 and two were in men of 30 and 40 years respectively. P. *Mansam-Bahr*

HAEMATOLOGY

BARNES G. T. An Investigation into the Causes of Severe Anaemia in Fiji. *J. Trop. Med. & Hyg.* 1948, July, v 51 No. 7 133 p. 6 figs.

Forty-nine cases of severe anaemia are discussed in this report. Of these 28 (57 per cent) were in Indian women and 18 (37 per cent) in Indian males. Only a very occasional Fijian case was encountered.

Twenty could be classified as hookworm anaemia of a hypochromic type which responded satisfactorily to iron. Four of the patients fell into the group "very light" and light infestation which may be of no clinical importance. That anaemia-producing factors other than hookworm infestation exist is shown by the absence of correlation between the degree of anaemia and the intensity of infestation. Thus 41 worms were recovered from a patient with haemoglobin percentage of 31 and 5000 from another with haemoglobin percentage of 58.

Furthermore gastric analysis revealed achlorhydria in one and hypochlorhydria in seven others, suggesting that a deficiency of dietetic iron may be the predisposing cause of the anaemia. Other anaemia-producing factors are malaria in one and chronic blood loss from haemorrhoids in another. Both these conditions were considered of less importance than hookworm infestation and dietetic iron deficiency.

Among the males there was a single case of hypochromic anaemia not attributable to hookworms.

It has long been appreciated in Fiji that there exists a peculiar manifestation of severe anaemia among young Indian women. These are often women with a haemoglobin percentage of 20. Fijian women have a lower normal level of haemoglobin than the men and it is reasonable to assume that the explanation lies in the iron-deficiency of the Indian diet made more acute by the loss of iron by menstruation and parturition.

Of eleven Indian women tested five had hypochlorhydria and four others achlorhydria and only two gave gastric analysis curves within normal limits. The ages of the fifteen patients in this hypochromic group ranged with one

exception from 15 to 30 whereas idiopathic hypochromic anaemia in temperate climates is a disease of the fourth and fifth decades Hookworm ova were found in the stools of ten out of these fifteen Ankylostomiasis however could be assessed as a contributory cause, the obstetric factor being predominant Probably the label hypochromic (obstetric anaemia) is most satisfactory

Four cases of hyperchromic anaemia were seen in Indian women between the ages of 20 to 30 Each had been in childbirth a month or less before admission and showed in this respect a resemblance to hypochromic (obstetric) anaemias Clinically, in the degree of enlargement of liver or spleen, in the presence or absence of glossitis, there was nothing to distinguish the hyperchromic from the hypochromic patients The most important feature in the initial stages is the finding of erythroblasts in blood smears and an abnormally high indirect Van den Bergh reaction This disease is the tropical nutritional anaemia commonly affecting young native women in India

Dimorphic (obstetric) anaemia was found in six Indian females between the ages of 19 to 30 and in one Indian man It appears that pregnancy, childbirth and lactation also play a large part in precipitating this severe anaemia Diagnosis is suggested by finding a remarkable mixture of macrocytes and microcytes in blood smears, but the final verdict is determined therapeutically by combined liver and iron

Two cases were classified as hypoplastic anaemia, an Indian woman of 25 and an Indian male of 60 The anaemia was very severe in both, the haemoglobin being under 25 per cent and the red blood corpuscles under 1 million per cmm, the mean corpuscular volumes were 70 cm and 80 cm and colour indices less than unity

The outstanding feature was their resistance to treatment with full courses of liver, iron, blood transfusions and hydrochloric acid P Manson-Bahr

SUNDARAM, S K Folic Acid in Megalocytic Anaemias (with a Digression on Achylia Gastrica in Addisonian Pernicious Anaemia) *Indian J Med Sci* 1948, Nov, v 2, No 11, 680-86 [13 refs]

A series of 14 cases of megalocytic anaemia, some of them complicated with diarrhoea One was an undoubted case of sprue All were treated with a preparation of folic acid and a combination of folic acid and liver With the exception of two cases the results were uniformly good In some a soluble preparation was used for injection in doses of 1 to 5 cc anaphylactic reaction had to be avoided No therapeutic differences could be found between pure folic acid or folic acid combined with liver

P Manson-Bahr

VENOMS AND ANTIVENENES

BOQUET P & LEHOULT, Y Les méthodes actuelles de préparation et de titrage des sérums antivenimeux [Methods Used for the Preparation and Titration of Antivenin] *Rev d'Immunologie* 1948, v 12, Nos 3/4, 116-26, 2 figs [32 refs]

The development of the methods for preparing antivenene for therapeutic use is briefly reviewed The early preparations were made by Calmette by the injection of gradually increasing quantities of venom, and antivenene of low potency was obtained, but only after a long series of injections With the substitution of formolized venom a much more potent antivenene was obtained in a few weeks the effect of the route of injection of antigen, the interval

between injection and the addition of taploca calcium chloride and other substances was studied and the method of immunization devised to economize antigen in wartime are described. The antibody is associated with the globulin fraction of the serum proteins can be concentrated by ammonium sulphate precipitation and refined by enzyme digestion.

The method of testing the potency of antivenene are also reviewed. The author consider that Calmette's original method whereby mixtures of varying quantities of anti-venene with a constant quantity of venom are injected, gives quickly and easily an estimate of therapeutic value but it is laborious. Ipsen's method which has been used with success by other workers was used by the authors who obtained consistent results on the whole in rabbits and mice they emphasize the need for using mice of the same weight and maintained under the same conditions of temperature diet etc., during the test. The limitations of Ipsen's method are pointed out as well as those of an in vitro method based on flocculation.

P. Harbo

DOVORN BARROS R. Primeros casos de escorpionismo por *B. arachnoides* *chrenbergi* (Gervais) 1841 [First Cases of Scorpionism by *Brachistosternus chrenbergi* (Gervais) 1841. *Rev. Med. Chile* 1949 May 78 N. 5 279-81 1 fig]

The following is a translation of the author's summary.

For the first time there are recorded two cases of scorpionism by the scorpion *B. arachnoides chrenbergi* (Gervais). Both followed a benign course however in one case various manifestations of classical scorpionism were present.

H. J. O. D. Burke-Gaffney

GREER W. E. R. Arachnidism. Effect of Calcium Gluconate in Six Cases. *New England J. of Med.* 1949 Jan. 6 v 240 No. 1 5-8, (20 refs.)

Arachnidism, a definite clinical entity in medicine is reviewed, and 6 cases successfully treated with intravenous injection of calcium gluconate are discussed.

Arachnidism should be considered in indigenous areas in the differential diagnosis of the acute surgical abdomen. It may imitate appendicitis perforated viscus peritonitis or any other acute surgical emergency.

"The syndrome following the bite of *Latrodectus mactans* may give symptoms referable to many system of the body. Nervous cardiac renal pulmonary and cutaneous manifestations may be present.

Burning of the soles of the feet may be pathognomonic in arachnidism.

"One should be familiar with the clinical picture so that proper diagnosis is made and proper therapy instituted with avoidance of unnecessary surgical operation.

DERMATOLOGA AND FUNGUS DISEASE

NUSSF. ANDRADE R. Trombidiasis por *Nesochoragastria* *de Hoffmann* 1944 [Trombidiasis caused by *Nesochoragastria*, the mite *Hoffmann*, 1944. *Gac. Med. de Mexico* 1947 Aug & Oct 77 Nos 4 & 5 221-41 31 fig on pl. (81 refs) English summary]

In September 1944 the author observed 6 cases of dermatitis in family of 3 adults and 3 children in Mexico City. The parasite concerned was *Nesochoragastria* *de Hoffmann* larvae of which were found on the scalp of girl of three. The disease then spread to the other members of the family.

The disease can affect any part of the skin but attacks particularly the scalp, neck, back, shoulders, axillae and retro-auricular folds. The dermatitis is polymorphic and its forms include petechiae, hives, papules, vesicles and especially molluscoid elements. The prominent feature is itching, together with a burning sensation and constitutional symptoms—leucocytosis and eosinophilia occur. Differential diagnosis from many other skin conditions is required and this is discussed in some detail. The acute stage lasts for one to four weeks. The course is usually benign. Abscesses and moniliasis may occur as complications. The larvae are parasitic on hens and infection is therefore commoner in rural areas. Prevention consists of treating chicken-pens with DDT.

The condition responded rapidly to treatment with preparations having a benzyl benzoate base.

The monograph is illustrated with 4 sketches of the larvae and 27 photographs, illustrating the clinical condition and several other forms of dermatitis.

H J O'D Burke-Gaffney

LATAPI, I. Carate o mal del Pinto. Clínica y diagnóstico diferencial. Comentario al trabajo del Dr A L Briceño Rossi. [*Differential Diagnosis of Pinta. A Comment on the Views of Dr Briceño Rossi*] *Medicina* Mexico 1948, Feb 10, v 28, No 549, 58-66.

The chief interest of this contribution lies in the discussion of Briceño Rossi's view that Cuban pinta is not the same as Mexican pinta. It appears that Rossi regards what has been called pinta or Mal del Pinto in Cuba as really a late manifestation of yaws or syphilis. León y Blanco maintains that the Cuban and the Mexican pinta are one and the same, because experimental inoculation of treponemata taken from these produces lesions indistinguishable from one another, and it is suggested that the early manifestations as seen in Mexico have passed unrecognized in Cuba. It is true that in 1944 material taken from a patient with pinta in Cuba, when inoculated into a human subject, produced syphilis, but that is explained by saying that the man suffered also from syphilis. León y Blanco has had the opportunity of studying the disease in both countries and is firmly of the opinion that they are identical. [Further study is needed to set all doubt at rest, it should be quite possible to inoculate a Mexican pinta subject with material from a Cuban patient and *vice versa* without the risk of inoculating syphilis at the same time. For previous observations by BRICEÑO ROSSI, see this *Bulletin*, 1944, v 41, 866, 867.] H Harold Scott

DUNCAN, J. T. The Epidemiology of Fungus Diseases. *Trans Roy Soc Trop Med & Hyg* 1948, Nov, v 42, No 3, 207-16 [21 refs].

In support of his thesis that a survey of fungus diseases in the British tropical colonies is long overdue, the author succinctly reviews with pertinent examples the results of recent studies in other parts of the world on the epidemiology of the dermatomycoses and the systemic mycoses. The need for providing special training in medical mycology and mycological methods for bacteriologists and pathologists stationed in the tropics is emphasized and the suggestion made that one way of meeting this need would be to include medical mycology as an elective subject in the curriculum for the Diploma of Tropical Medicine.

G C Ainsworth

DOWDING, Eleanor S. The Spores of *Histoplasma*. *Canadian J Res Sect E Med Sci* 1948, Oct, v 26, No 5, 265-73, 2 figs & 4 pls [14 refs].

The characteristic, terminally attached, spherical chlamydospores of the mycelial form of *Histoplasma capsulatum*, bear, on all parts of their surface,

Idi sore (diphtheritic desert sore)—This term should be confined to ulcers of diphtheritic origin the diagnosis being made bacteriologically and the condition treated with anti-diphtheritic serum administered by injection and applied locally.

Septic ulcer (pyrogenic ulcer)—The author considers that this term should be limited to ulcers due to the pyrogenic cocci usually the streptococcus and within the staphylococcus. The ulcer often begins as a small pustule or group of pustules, or as a bulla containing pus which soon bursts. Clinically the appearance is not characteristic and diagnosis is made on the finding of pyogenic cocci and absence of *C. d. pharyngae* and *Micrococcus (Coccobacillus) pyogenes*. Surely there are other organisms which should be taken into account. Treatment is by sulphonamides locally and orally and penicillin locally and by injection.

Tropicaloid ulcer (mycetoid desert sore)—An ulcer commencing usually as a vesicle which rapidly enlarges and bursts the condition is common in many parts of Africa and is often confused with true tropical ulcer or velvety sore. The pathology and bacteriology are very fully described and for full details the reader must be referred to the original paper. A Gram-negative coccus or cocco-bacillus (named by the author *Micrococcus (Coccobacillus) mycetoides*) is constantly found in initial lesions the organism growing well on 1 per cent tryptic agar and especially on 2 per cent glucose agar. It can be subcultured and the condition reproduced in human beings by application of cultures to scratched or abraded areas (performed in 13 cases) the ulcer is auto-inoculable and hetero-inoculable. Attempts to reproduce the conditions with organisms of the a isolated flora have failed and natural immunity does not appear to exist.

In a typical established case one to four ulcers are seen these may be open or covered with crusts and are usually on the lower two-thirds of the leg. The ulcers are round or oval, rather superficial rarely more than 4 cm. in diameter the margins being usually not undermined. The ulcers are seldom painful, the inguinal glands are not enlarged, and lymphangitis is never noted the lesions may occur anywhere on the body.

Clinically superficial, infiltrated or nodular, eczematoid crusty and general pyodermatid types are described. The ulcer has a protracted course of 3 to 12 months or longer.

In treatment, sulphonamides and penicillin should be tried, but the latter is too expensive to use in thousands of cases in some parts of the tropics. The patient is kept at rest for a few days and hot boracic fomentations are applied twice daily an ointment of 4 gm. dermatol (not described) and 25 gm. vaseline is then applied daily on a piece of gauze which is lightly bandaged on. Immediately before application it is useful to wash the sore lightly with hydrogen peroxide. The lotion described above applied once daily is often useful. Vaccines of the causal organisms seem to be useful for treatment in some cases.

The slightest abrasion should be immediately painted with tincture of iodine and long trousers worn instead of shorts if there is much chance of abrasion from shrubs etc. Vaccines give no protection.

[The terminology of ulcers found in the tropics has become rather confused and misleading. No mention is made of cutaneous leishmaniasis in this paper.]

C. F. Slack

MISCELLANEOUS DISEASES

LEWIS, H B, FAJANS, Ruth S, ESTERER, Marie B, SHEN, Chao-wen & OLIPHANT, Margaret The Nutritive Value of some Legumes Lathyrism in the Rat The Sweet Pea (*Lathyrus odoratus*), *Lathyrus sativus*, *Lathyrus cicera* and some other Species of *Lathyrus* *J Nutrition* 1948, Nov 10, v 36, No 5, 537-59, 1 fig [27 refs]

The authors, using young whiterats, 50-80 gm in weight, as their experimental animals, have tested the nutritive values and the toxicities of the following 8 species of *Lathyrus* *L. odoratus*, *L. sativus*, *L. cicera*, *L. hirsutus*, *L. tingitanus*, *L. aphaca*, *L. sphaericus* and *L. sylvestris Wagneri*

Those rats which were fed with 50 per cent of the pea-meal of *L. odoratus*—the one most fully described—uniformly showed signs of lathyrism, incontinence, paralysis of the limbs and spinal curvature coming on after a fortnight on this diet With older rats, weighing up to 250 gm, the same clinical picture was produced but the curvature was less marked In the femur, changes similar to osteomalacia were produced and in the tibia osteoporosis from demineralization There was haemarthrosis of the knees, strongly reminiscent of Charcot's disease in man The toxicity was the same even when casein to 25 per cent was added, or in the presence of good animal protein This is of interest in disposing of the theory that tryptophane deficiency is an aetiological factor in lathyrism The addition of powdered liver extract to the diet also failed to protect against the onset of symptoms of lathyrism, nor did liberal amounts of ascorbic acid affect the issue

The toxic principle is thermostable, resisting 80°C for 24 hours, and 120° for 6 hours It can be removed by slow percolation of the meal with 30 per cent alcohol, or by cold water, but not by ether

Analogous details are given, but less fully, of the results of feeding the animals with the other 7 species of *Lathyrus* *L. sylvestris Wagneri* was the most toxic of all With this, some of the animals showed symptoms of poisoning after only 4 gm of the legume had been taken, the animals would refuse the food in 2-3 days and died between the 4th and 10th days The symptoms also were more severe there was excitability, convulsive seizures with increased and spasmodic respiration The attacks could be induced by slight stimulation such as knocking on the cage or touching with a rod Older rats showed a similar train of symptoms but in them the onset was, as a rule, later The effects in those which survive appear to be permanent and in one instance it is reported that these attacks could be induced some 8 months after the *Lathyrus* had been withdrawn

The authors summarize the results of their experiments with the young white rats in the following words —

Lathyrus sativus and *cicera* showed no toxicity and promoted growth as effectively as did the edible white split pea of commerce *Lathyrus aphaca* was nontoxic but was inferior in growth promotion to the other species

Lathyrus hirsutus, *tingitanus*, *sphaericus* and *sylvestris Wagneri* were toxic, and the last three were unacceptable to rats (they are listed in order of increasing toxicity) Of these, *Lathyrus sylvestris Wagneri* was most acutely toxic and appeared to contain a toxic substance which produced marked injury to the nervous system The toxic material of *L. tingitanus*, *sphaericus* and *sylvestris Wagneri* could be extracted by 30 per cent alcohol and the extracted meal was effective in promoting growth

With the species less acutely toxic (*L. hirsutus* and *tingitanus*) it was possible to obtain the skeletal changes described as typical of lathyrism "

H Harold Scott

BERT E. \ Pigmentation of the Tongue in African Children. *East African Med J* 1948 Nov v 23 No. 11 433-7

It is concluded that pigmentation of the tongue is not of any apparent clinical significance in Lala children.

"It is possible that the back end of this condition will be found to vary in different groups living under different environmental conditions."

SINHA, S. B. Two Cases of Tropical Eosinophilia in Tes Estate Practice. *Indian Med Gaz.* 1948 Sept v 83 No. 9 421.

VISWANATHAN R. Pulmonary Eosinophilosis. *Quart J Med (n.s.)* 1949 Oct., v 17 No. 68, 257-70 * figs. on pl. [43 refs.]

After reviewing the relevant literature the author discusses the aetiology and symptomatology of pulmonary eosinophilosis (or tropical eosinophilosis). The clinical material was provided by 707 patients of whom 189 were army personnel on active service in E. Bengal, Assam, and Burma. Predominant symptoms were cough, lassitude, breathlessness on exertion, fever, asthma, heaviness or pain in the chest, haemoptysis and palpitation. Splenic enlargement was found in 76 per cent. of cases.

Characteristic mottling of the lung fields was found on X-ray examination in 51 per cent. of cases; this was sometimes uniformly distributed throughout both lung fields, and sometimes confined to one lung or a part of a lung. The eosinophils were raised above 4,500 per cmm. in 86 per cent. of cases and above 10,000 per cmm. in 49 per cent. of cases. There was a raised ESR in 73 per cent. of cases, a high titre cold agglutination in 78 per cent., a positive W.R. in 49 per cent., and a positive Paul Bunnell reaction in 73 per cent. of cases. Microscopical and cultural examinations of both sputum and blood in 17 cases failed to reveal any specific organism, nor were parasites found in specimens of sputum from 21 patients after examination by the method described by CARTER, WOOD and D'ABERRA (ibid. *Bulletin* 1945 v 20 73). Total and differential white counts made during the course of treatment showed an initial increase in the eosinophils and a subsequent fall. The reduction in the eosinophil count was not so rapid as the amelioration of symptoms and general counts were not obtained until a week to a month after the completion of treatment.

Exacerbation of symptoms and an increase in the eosinophil count after an injection of 0.15 gm. of neosarphenamine were used as diagnostic criteria to distinguish pulmonary eosinophilosis from other conditions causing eosinophilia, particularly asthma.

Routine treatment consisted of one injection of 0.15 gm. neosarphenamine followed by seven injections of 0.5 gm. at weekly intervals. One patient developed arsenical encephalopathy and died after the second injection of neosarphenamine. Autopsy revealed multiple dark reddish brown areas both on the surface and within the tissues of both lungs. These areas varied in size from 0.5 cm. to 2.5 cm. in diameter and were peribronchial in distribution. Microscopically they consisted of tubercle-like nodules with a group of pus cells in the centre surrounded by a layer of monocytes.

Pulmonary eosinophilosis was considered by the author to be a distinct clinical entity probably an infection caused by an unknown sensitive organism.

H. T. H. H. H.

BERRE, L. A propos d'un cas d'éléphantiasis nostras [A Case of "Elephantiasis Nostras."] *Rev Méd Nav (Métropole et Outre-Mer)* Paris 1948, v 3, No 3, 299-305

A young man, aged 20 years, a cultivator living in a small village in Basses-Pyrénées, who had never before left his native mountains, came to Bordeaux with a diagnosis of elephantiasis-like oedema of the lower limbs

Two years previously he had had a pleural effusion, a milky fluid was obtained each time this was aspirated. He also had a swelling of the abdomen. A provisional diagnosis of hydatid cyst had been made, but was later abandoned. Soon after this, swelling of the lower limbs developed. Next year the condition was unchanged, but he had a febrile attack associated with arthralgia during which the swelling declined temporarily.

When he was seen by the author, he had massive oedema of the lower limbs, swelling of the abdomen with a little ascites, and a pleural effusion at both bases. The skin of the lower limbs was hard, thickened and indurated, and the movements of the limbs were restricted. The blood count was within normal limits except that there was a constant eosinophilia which varied from 12 to 20 per cent. This last observation suggested a parasitic infection, but no ova, cysts, or parasites were found in his stools, and no microfilaria in the night or day blood on repeated examination. A biopsy of an axillary lymphatic gland showed nothing significant except dilatation of the lymphatic channels.

An attack of pneumonia caused a temporary improvement and thus suggested fever therapy, this was carried out with several substances but was without good effect.

The author had used this case as the basis for a discussion on the aetiology of elephantiasis. He discusses the rôle of bacteria, especially the streptococci which he considers the aetiological agent in both "true" elephantiasis and "elephantiasis nostras".

The two points of interest in the case were the fact that the large central lymphatics were first involved and later the skin lymphatics: thus he considers a reversal of the usual order. The second was the eosinophilia which is unusual in the absence of any parasitic infection.

L. E. Napier

MONTALVAN, C. J. A. Enfermedades del hombre transmitidas por insectos y otros artrópodos [Human Diseases transmitted by Insects and other Arthropods] *Rev Ecuatoriana de Hig y Med Trop* Guayaquil 1944, Dec, v 1, No 4, 388-409

PROTOZOOLOGY GENERAL

JACOBY, N. M. & SAGORIN, L. Human Toxoplasmosis in England. Report of a Case. *Lancet* 1948, Dec 11, 926-8, 2 figs [30 refs.]

This is the report of a case, showing symptoms of involvement of the nervous system which suggested a diagnosis of toxoplasmosis.

An infant of four months was admitted to hospital with a history of persistent crying, anorexia and enlargement of the head. The mother, father and three other children were alive and well. No domestic animals were kept but the house was said to be infested with rats. The diagnosis was based on the clinical and serological findings as noted below.

The child was well nourished, but hydrocephalic. No important abnormalities were noted in heart, lungs or abdomen. The eyes were proptosed and showed deviation to the left and nystagmus. The fundi showed extensive chorioretinitis and optic atrophy, and vision was probably negligible.

Radiograms of the skull revealed thinning of the calvarium and areas of calcification in the cerebrum. The cerebrospinal fluid obtained by ventricular tap showed no organisms and cultures were negative. Animal inoculation with gastric washing blood and cerebrospinal fluid caused no infection nor were any toxoplasma bodies found in any material examined.

Antibody neutralization tests were carried out on the infant and mother. The infant gave a dubious reaction but the serum of the mother neutralized 25 skin-reactive doses.

The disease had not progressed at the time of the report.

The case would appear to have satisfied most of the criteria for diagnosis of toxoplasmosis short of the demonstration of toxoplasma bodies but it has to be conceded that in very few cases have these been demonstrated during life.

H. E. Short

FRANKEL, J. H. Dermal Hypersensitivity to *Toxoplasma* Antigens (*Toxoplasmosis*). *Proc Soc Exper Biol & Med* 1948 July-Aug. 76, No. 7 634-8

Past and possibly latent infection with *Toxoplasma* have previously been demonstrated both by *Toxoplasma*-neutralizing antibody and complement fixation tests. Both these methods have drawbacks. Thus the neutralizing antibodies are unstable unless stored in the frozen state, the reading of the test cannot be done under a week, and results are often equivocal. It is also necessary to maintain a strain of *Toxoplasma* for the tests. In the case of the complement fixation test, the complement-fixing antibodies are evanescent and would appear to indicate a recent infection only.

These facts rendered it desirable to prepare *Toxoplasma* antigens suitable for skin test which would eliminate these drawbacks. The first antigen prepared was from *Toxoplasma* grown in the developing chick by inoculation on to the chorioallantoic membrane of 7-9-day-old chick embryos. The culture was harvested after 4 or 5 days, the membranes ground up, diluted with normal saline solution and then frozen and thawed repeatedly. The suspension was centrifuged, the deposit discarded and the supernatant fluid after addition of a disinfectant was passed through a Seitz filter. Uninfected membranes similarly treated acted as control antigens.

This antigen was titrated on guinea-pigs carrying latent infections of *Toxoplasma*. It was found that 0.1 cc. of a 1 in 50 dilution would produce erythema and induration of 30 and 15 mm. in diameter respectively after 24 hours while in normal control animals erythema of few millimetres only in diameter was produced. The control antigen produced an erythema of less than 5 mm. in diameter in both normal and immune guinea-pigs.

In testing this antigen on man an induration of 15+ mm. at the site of the test dose was considered a positive test if the control antigen gave an induration of not more than 4 mm. The reaction took 24 to 48 hours to develop.

The chick embryo antigen was later replaced by hamster and mouse antigen. These were prepared from the sediment of peritoneal exudate of heavily infected animals which had been infected by the peritoneal route. This had the advantage over the chick embryo antigen of being much richer in *Toxoplasma* bodies in proportion to the cells of the host animal and so possessed greater potency. The heparinized exudate was centrifuged, the supernatant discarded and the deposit resuspended in 10 times its weight of normal saline solution. The suspension was exposed to ultra violet light to kill the *Toxoplasma* and accidental contaminants and was then frozen and thawed repeatedly to break up the organisms. A 1 in 1000 dilution in 0.3 per cent. phenol-saline solvent was now prepared as the final antigen for use.

For the control antigen ground-up mouse or hamster spleen, treated in a similar manner was used

The antigens were tested for non-toxicity and sterility and then potency tests were carried out on guineapigs with latent *Toxoplasma* infections

In applying the test to human beings, the result was considered positive if there was induration of 10-30 mm and erythema of 10-50 mm in diameter after 48 hours. The control should not show more than about 3 mm diameter of erythema after 48 hours. The antigens prepared by the means described are referred to as *toxoplasmins*

When skin sensitivity to toxoplasmin is compared with evidence of neutralizing antibodies in patients, there is shown to be a high correlation. In cases where the skin test was positive and the antibody neutralizing test negative there was sometimes produced subsequently an anamnestic rise in the neutralizing antibody titre

The simplicity of the toxoplasmin skin test and the early reading of results are said to make this the most useful single aid in the diagnosis of toxoplasmosis, past or latent, where isolation of the organism is not possible

H E Shortt

RUCHMAN, I & JOHNSMANN, R J Biological Properties of a Strain of *Toxoplasma* recovered from a Fatal Case of Congenital Toxoplasmosis
Imer J Trop Med 1948, Sept, v 28, No 5, 687-95, 4 figs [14 refs]

A fatal case of toxoplasmosis in an infant is described, from which the causative organism was recovered. [The statement in the first paragraph that where organisms cannot be demonstrated "the final proof must rest on the demonstration of cross-immunity with a known strain of toxoplasma" surely needs some modification as in all parasitic diseases the final proof is demonstration of the causative organism.]

Toxoplasma bodies were seen in brain material and inoculation into laboratory animals was successful. Cross-immunity studies were made between the strain isolated (C G) and a highly pathogenic strain (R H) from another source. These showed a high degree of cross-immunity between these strains.

The results give further corroboration to the prevalent opinion that probably there is only one strain of *Toxoplasma* involved in the human and animal infections which have been observed.

This case is a proved addition to the small number of cases where, in the human disease *Toxoplasma* has actually been demonstrated in the tissues.

H E Shortt

ENTOMOLOGY AND INSECTICIDES GENERAL

WHEELSWORTH, A B The Insect Cuticle *Biol Reviews* 1948 Oct, v 23 No 4 408-51 7 pages of refs

WALTON, G A A Minute Bethyloid Wasp of Medical Interest *Proc Roy Ent Soc London Ser A Gen Entom* 1948, Dec 28, v 23 Pts 10/12 98

In Sierra Leone, West Africa there is a minute Bethyloid wasp *Scleroterma kollasteri* which frequently stings man especially if it is caught between the skin and the clothing. The Bethyloids are a family of Vespoïd Hymenoptera. *Scleroterma* is parasitic on the larvae of beetles, the eggs being laid on the surface of the host. We do not know of any previous record of Bethyloids stinging man.

P 4 Buxton

- DETHIER V. G. & CHADWICK, L. E. Rejection Thresholds of the Blowfly for a Series of Aliphatic Alcohols. Reprinted from *J. General Physiol.* 1947 Jan. 20 v. 10 No. 3 47-53 [41 refs.]
- CHADWICK, L. E. & DETHIER V. G. The Relationship between Chemical Structure and the Response of Blowflies to Tarsal Stimulation by Aliphatic Acids. *Ibid.* 45-62 [17 refs.]

Using blowfly adults, *Phormia regina* from which the antennae and labella have been removed so as to eliminate the olfactory receptors the authors test the stimulative power of certain organic compounds when brought into contact with the taste receptors of the tarsal. The flies which are suspended by their wings from a waxed rod, respond to tarsal contact with a 0.1 M sugar solution by extending the proboscis, but this response can be prevented by the addition of an organic substance to the sugar solution. That concentration of a graded series of dilutions of the added substance which prevents the proboscis reaction is taken as a measure of the substance's stimulative efficiency and is referred to as its threshold of rejection. The technique has enabled series of related organic compounds to be tested and their stimulatory efficiency to be compared with their chemical structure and properties.

In the first paper the authors report studies on fifteen aliphatic alcohols and, in the second paper on eighteen aliphatic acids and one mineral acid. It is concluded that stimulation by the alcohols and the acids involves surface energy relationships but it is not certain whether their penetration into the receptor cells or accumulation in the cell membranes causes the excitation. The hydrogen ion is the most stimulative component of the acid compounds and it is concluded that the anion, rather than the undissociated acid, is next in importance. Substitutions and other structural alterations to the acid molecule lessened the stimulative power of the anion but this was counteracted usually by increased dissociation of the acid resulting in increased stimulatory efficiency due to the hydrogen ions.

The technique is recommended as having applications in the development of improved insect repellents and, possibly, for work on insecticides.

D. S. BERTON

- HAYES J. L. Ecological and Biological Observations on some Coprophagous Sepidae (Diptera). *Proc. Roy. Entom. Soc. London* Ser. A, Gen. Entom. 1948, Dec. 28 v. 23 Pt. 10/12 99-101 1 fig. [14 refs.]

The Sepidae are a family of minute flies many of which breed in dung. Their biology has been somewhat neglected, perhaps because they have no direct medical importance.

The author records ten species of Sepidae in Egypt and describes details of the life history. The early stages are preyed upon and greatly reduced in numbers by certain beetles of the families Histeridae and Staphylinidae.

P. A. B. 14

- LEWIS D. J. The Simuliidae of the Anglo-Egyptian Sudan. *J. an. Roy. Entom. Soc. London* 1948 Dec. 15 v. 90 Pt. 14 4 3-93 4 figs. on 1 pl. & 11 maps. [37 refs.]

The author gives an interesting and valuable account of the distribution of the fifteen species of Simuliids known in the Anglo-Egyptian Sudan the text matter being illustrated by a number of maps which show at a glance the distribution of the separate species. The species recorded are *S. alpinus*, *S. alcocki* var. *newlandi*, *S. boeckii*, *S. cervicornis* var. *S. damocles* & *S. dracunculoides*.

S. griseicollis, *S. impukane*, *S. lepidum*, *S. mcmahoni*, *S. medusaeformis*, *S. nigritarsis*, *S. ruficornis*, *S. unicomitum* and a new species as yet undescribed. Specific descriptions are not included.

Simulids flourish in the western tributaries of the Upper White Nile, in the main Nile below Khartoum, and in the Upper Blue Nile and Upper Atbara River areas. The lower part of the Nile in the Sudan is heavily infested with *Simulids*. This and certain instances of discontinuous distribution of species in isolated hill regions are discussed in relation to the nature of the water courses which probably existed in the Sudan in ancient times.

Some early accounts, dating back to 1822, of travellers' experiences of flies, now known to have been probably *Simulium*, are quoted.

The paper is not only concerned with the distribution of the species, bionomical notes are contained under species and in sections dealing with the topography and species of particular areas.

The two species biting man in the Sudan are *S. damnosum* and *S. griseicollis*, the former is probably the vector of *Onchocerca volvulus* to man in the Sudan [this *Bulletin*, 1948, v 45, 531], onchocerciasis is considered to be responsible for blindness in the Bahr el Ghazal Province [this *Bulletin*, 1935, v 32, 650]. *S. griseicollis* is a serious biting pest in the northern Sudan.

S. damnosum occurs both in the northern and southern Sudan. It has a wider range of breeding places in the Sudan than in Central Africa, being found on mud in rather placid waters with a speed of 2 km/hour, as well as in rapids. Pupae have been collected from mud, rocks, cords of fish-traps, on sedge and other plants, they occurred even at depths of 60 cm. The habits of the adult are as in other countries, it prefers wooded country but has been found biting in barren rocky desert several kilometres from breeding places. The possibility is mentioned that onchocerciasis may spread to areas populated by *S. damnosum* but as yet free of the filarial parasite.

S. griseicollis is distributed mainly in the lower Nile from the Gezira Area southwards. A small outbreak of flies usually occurs about December but the main fly season is about March, there being probably a reduction of breeding in the intervening period owing to the low winter temperature. In summer, the hot dry climate probably kills off large numbers of adults. This species occurs in immense dense swarms consisting of probably many millions of flies and extending from the river over the desert on both sides. The flies do not engorge readily on man but they cause intense annoyance by walking on exposed parts of the body, particularly on the head, and probing the skin. Engorgement on man is slow, taking from 4 to 16 minutes. Birds, domestic poultry, cattle, horses and donkeys are attacked viciously, and there are reports of donkeys, caged birds and poultry dying of mass infestations of the fly. Biting rarely occurs indoors, and ceases after twilight. Both sexes, but particularly the males, are found probing date and mango flowers. They can be seen resting on vegetation during the day but disappear at night. The day-time clouds which are so characteristic of heavy densities of this species may contain both males and females.

Breeding takes place mainly in unbroken river water, the larvae and pupae being found not only on sedge, roots, sticks and stones but—and this is of particular importance—on moderately hard mud in water flowing as slowly as 0.8 km/hour. Dense clusters of pupae occur at depths of 75 cm and probably deeper. In the Dongola area, on the lower Nile, and severely infested by this species, the Nile is 600 to 1,300 metres wide and even at low water is a large river. Owing to erosion and deposition there is both a constant slow destruction and formation of islands. The banks are also subject to changes in form. There is, therefore, a continual change in the position of the many mud areas suitable for breeding *S. griseicollis*. Breeding in this mud is profuse and probably far

exceeds the amount of breeding which occurs on ridges and other substrata.

The author draws particular attention to the importance of the environment. It is considered that earlier records of *S. griseocollis* having flown long distances (including up to 250 miles) probably overlook the fact that the swarms were derived from mass breeding on mud in local and placid waters and not from distant rapids as was supposed. However record of flights to 80 km. from the Nile seem to be true and the fly is known to occur in the desert near Dongola in numbers sufficient to cause annoyance.

Domestic animals are sometimes provided with protective smoke cloths or dark shelters during the day or they feed only outdoors at night. Protective smokes and clothing are employed by the human population. Flies are avoided in the fly season or outdoor work is done during windy weather. In the fly is less active. The use of repellents is thought to be the most practical large-scale measure against *S. griseocollis*. Undiluted liquid dimethyl phthalate has given promising results for *S. griseocollis* and *S. damnosum* flies shelter for only an instant on the treated skin. In view of the dry air and cool temperatures of the fly season it is not thought that sweat is a serious disadvantage to the use of this repellent.

Human agency appears to play little part in the dispersal of *Simulium* spp. in the Sudan. Irrigation schemes have been responsible for the occurrence of *Simulid* breeding in some places.

This paper contains much detailed information and should be consulted in the original by those interested in the bionomics of *Simulium* species and the problems arising in their control.

D. S. BERTON

MACKERRAS M. Josephine & MACKERRAS I. M. Simuliidae (Diptera) from Queensland, Australia. *J. Sci. Res. Ser. B* 1948 May 1 (No. 21) 2-14 text figs. 4 figs. on 2 pls. 14 ref.]

The authors undertook a survey of the Simuliidae of south Queensland, Australia, during the period February to June 1947 with a view to establishing the identity of the pest species generally considered to be *Austrosimulium bancrofti* (Tayl.) concerning the morphology of which conflicting literature had appeared.

Prior to this survey three species had been reported from Queensland but the present paper increases the number to eight species and one subspecies, four of the species and the subspecies being new to science. Keys and figures are given for the identification of adult pupae cocoons and larvae and notes on the biology of the species are appended to the systematic descriptions.

A. bancrofti was found to comprise two species which had hitherto been confused, namely *A. bancrofti* (Tayl.) and *A. pusillum* n. sp. the latter being the important biting pest of the inland region of Queensland. *A. bancrofti* (Tayl.) has nine antennal segments and *A. pusillum* ten; there are other minor differences. The immature stages are more readily distinguished.

The pest species *A. pusillum* has a very short season, apparently about March-April chiefly, the fly was beginning ten days after the flood waters come down and lasting for 10-14 days. Only in the event of repeated floods do further fly waves occur. The larvae and cocoon are found in the torrential (speed over 4 ft per second) turbulent muddy water and are attached particularly to the submerged branches and fronds of the tea tree *Melaleuca argentea*. As the flood waters recede larvae and living pupae are no longer found, but the intensive breeding during the height of the flood is apparent by the exposed masses of empty pupal shells in their cocoons. Adult *A. pusillum* occur in great numbers on the *Melaleuca* shrubs of the stream bed and the river

banks, they attack man and domestic stock viciously. They have been reported as following stock for ten to twelve miles from the breeding place but, otherwise, do not seem to disperse far from the water-courses.

Larvae of *A. bancrofti*, and of other species, entirely replace *A. pestilens* as the rivers slow down and become less muddy, but despite the large numbers of adults of *A. bancrofti*, and of other species, which must emerge, few or none have been found in the vicinity of the breeding places. Either their habits were cryptic or dispersal was rapid and wide. *A. bancrofti*, although known to bite man and animals, was not troublesome in Queensland.

S. ornatus Skuse was the only species seen to oviposit and the only species of which the eggs were found. The females did not enter the water but deposited their eggs at the very edge of the water on logs, grass, and rocks. Development from oviposition to adult probably required two to three weeks, the egg and the pupal stage lasting about five and three days respectively.

The subsidence of the floods followed by complete drying up of streams prompts the authors to suggest that there must be a stage, probably the egg, which resists desiccation and enables the inland species, including *A. pestilens*, to pass through the long periods of summer drought to which they are exposed.

In a brief discussion of the control of *A. pestilens*, it is pointed out that the terrain is difficult to traverse by land during the floods, but that the addition of DDT, if necessary from aircraft, to the torrents or the use of DDT-dipped cattle as poison baits, are methods worth a trial. At present, smudge fires are used for the local protection of man and animals.

An apparatus for breeding out larvae and pupae collected in the field is described and figured.

D. S. Bertram

VARGAS, L. & DÍAZ NÁJERA, A. Nota sobre la identificación de los simúlidos de México. El subgenero *Mallochianella* n. n. [A Note on the Identification of Simuliidae in Mexico]. *Rev. Inst. Salubridad y Enfermedades Trop. México* 1948, Mar., v. 9, No. 1, 65-74, 2 figs. on pl. [10 refs.]

The English summary appended to the paper is as follows:—

"The authors present a key for the identification of seven genera of Simuliidae giving a new definition of them. Within the genus *Gigantodax* they propose the new name *Mallochianella* for a subgenus with *Simulium* (*Mallochianella*) *sibirica* (Enderlein), 1930, as the subgenus type. According to the new definition of *Gigantodax* its distribution now includes an Australian species, formerly the genus was considered as neo-tropical. For the first time now appear keys for the identification of the adults of the Mexican blackflies."

HERTIG, M. A New Genus of Bloodsucking Psychodids from Peru (Diptera Psychodidae). Reprinted from *Ann. Entom. Soc. America* 1948 Mar., v. 41, No. 1, 8-16, 13 figs. (12 on 2 pls.)

Descriptions are given of the female and male of *Harleya phlebotomica* n. gen. and n. sp. These flies are similar to sandflies of the genus *Phlebotomus* but the new genus is created on account of differences mainly in size, the wing shape and posture, the cibarium of the female, and in the male genitalia.

During extensive collecting of *P. verrucarum*, *P. noguchi* and *P. perniciosus* in connexion with studies on Carrion's disease small numbers of female *H. phlebotomica* were taken occasionally in houses, caves, pigpens, and on stone walls. Only six males have been found. They were taken in the vicinity of a stone wall on top of which ran an irrigation channel, an environment where numerous females were collected. Females were captured containing blood [? origin], they fed on man in the laboratory and were twice seen to bite man.

in natura. They fly with the short, hopping flight of *Phlebotomus*. The majority of the specimens were taken at altitudes between 2,000 and 2,400 metres. This zone is covered by the distribution range of the three species of *Phlebotomus* and is the upper limit for verruga; there is no evidence of any part which *Phlebotomus* may play in transmitting the disease. D. S. Botom

VAN DER KUYT E. Mosquito Records of the Netherlands Windward Islands. *Amer J Trop Med* 1948 Sept. v 28 No. 5 747-9

The Netherlands Windward Islands in the Caribbean sea consist of St. Martin, Saba and St. Eustatius. The population (3 823 in 1946) is diminishing. The short note describes the climatic conditions and gives a list of seven species of mosquitoes collected during a two-week survey in the dry season in April 1947. The mosquitoes collected were *Aedes aegypti*, *Culex quinquefasciatus*, *C. fatigans* (both common), *Aedes bushii*, *Culex americanus*, *C. bahamensis*, *C. habilitator* and *Democerites cencer*. No anophelines were taken although special search was made. There is little evidence of mosquito-borne diseases in these islands at the present time. Cases of malaria mentioned in Government reports have always been confined to people who had visited other islands. Of four people found at Curacao infected with *Wuchereria bancrofti* two at least may have been infected in the Netherlands Windward Islands. Autochthonous cases of dengue have been found but the last two cases of yellow fever were reported on St. Martin in 1879. H. S. Loren

TRACER, W. Biotin and Fat-Soluble Materials with Biotin Activity in the Nutrition of Mosquito Larvae. *J Biol Chem* 1948, Dec. v 176, \ 3 1211-21 1 fig. (30 refs.)

GOLBERG, L. & DE MEILLON H. The Nutrition of the Larva of *Aedes aegypti* Linnaeus. 3. Lipid Requirements. *Biochem J* 1948, v 43 No 3 372-8 (30 refs.)

GOLBERG, L. & DE MEILLON H. The Nutrition of the Larva of *Aedes aegypti* Linnaeus. 4. Protein and Amino-Acid Requirements. *Biochem. J* 1948, v 43 No. 3, 379-87 (43 refs.)

PARKER, A. H. Stimuli Involved in the Attraction of *Aedes aegypti* L., to Man. *Bull Entom. Res* 1948 Dec. v 39 Pt 3 387-87 1 fig

The author has studied the rôle of warmth, moisture and smell as stimuli attracting female *Aedes aegypti* to the host.

The apparatus used consisted of a glass tube 29 cm. long and 5 cm. in diameter. Each end was fitted with a metal cup 1 cm. deep inserted below innermost and with netting stretched across a wide hole cut in its base. The tube was mounted in a chamber lined with white paper and illuminated by a diffused overhead light. Holes in this chamber allowed for the introduction of mosquitoes and test objects as well as for observation. The experiments were made in a room at $28 \pm 1^\circ\text{C}$. and 50-70 per cent relative humidity. It was not practicable to obtain mosquitoes of the same age for each experiment, but the tabular matter records the range of age for each group. They were fed solely on sugar solution.

For each experiment 30 mosquitoes were lightly anaesthetized with ether and transferred to the tube. When they had recovered counts were made at each half-minute interval during a five-minute period of the number of mosquitoes on the netting at one end. A test object (e.g. the hand) was then placed on the cup of this same end and counts were made a before. The

mosquitoes could not touch the test object. The first count was the "control" and the second the "test" count. This procedure was repeated at least twice for each object.

The author expresses the result as an Index of Attraction (I_a), derived thus —

$$I_a = \frac{100 T}{T + C}$$
 where T is the total number of mosquitoes observed on the netting in the presence of a test object, and C is the number observed in the absence of any test object.

An I_a of 100 indicates maximum positive response [attraction], of 50 indifference, and of 0 a maximum negative response [repellence].

Responses were determined for the hand, warmth (water in a flask at the temperature of the palm of the hand and at the palm temperature plus 1 to 4°C), cold moisture (water-soaked filter paper at room temperature), warmth plus moisture (water-soaked filter paper over the water flask at palm temperature), and cold sweat, representing smell (sweat-soaked filter paper at room temperature).

Warmth alone was found in ten tests to have no marked attractive, nor repulsive, effect ($I_a = 36.1$ to 56.9). The author considers the possibility that activation of the mosquitoes by warmth might have caused them to land on and leave the netting in rapid frequency with the result that the counts made at particular instants would underestimate the actual number of mosquitoes attracted to the netting by the warmth. However, the number of mosquitoes landing on the netting over a period of time in the absence, and in the presence, of warmth was 66 and 69 respectively, and it is concluded that warmth had neither a marked attractive nor activating effect.

The following mean I_a values were obtained from twelve tests of the other test objects: hand (69.6), warmth plus moisture (65.5), cold sweat (73.3), cold moisture (69.1). These results indicated attraction by all four objects but the activating effects induced by them required consideration. In this series, activation was estimated by (a) counting the number of mosquitoes leaving the netting in a given period of time and (b) recording the percentage probing at the netting. The numbers leaving the netting were 503 (hand), 576 (warmth plus moisture), 209 (cold sweat), 173 (cold moisture) 13 (no test object), while the percentages probing were 52.9 (hand), 59.3 (warmth plus moisture), 20.3 (cold sweat), and 21.9 (cold moisture). It is concluded that the Indices of Attraction for these test objects are misleading and that, if allowance is made for the activating effect of each stimulus, then the hand and warmth plus moisture are markedly and possibly equally, attractive and activating but that cold sweat and cold moisture are less stimulating in both respects. Of these, cold sweat appeared to be more attractive than cold moisture. This is presumed to be due to an olfactory stimulus inherent in the sweat. Statistical tests are applied in comparing data not obviously significant at inspection.

In further discussion of the lack of activation and attraction by warmth alone as opposed to the marked activation and attraction of warmth plus moisture it is postulated that response to warmth may take place only under certain conditions of humidity.

The work of DeLong *et al* (*Rep Nat Res Coun Insect Contr Comm*, Washington, 1945 No 176) is noted as being in general agreement with the results obtained in the present experiments but it is observed that CHRISTOPHERS (this *Bulletin* 1948 v 45, 40) records *Aedes aegypti* being attracted to warmth (40°C) and showing little additional attraction to warmth plus moisture and that moisture at room temperature had 'no attractive effect'. It is suggested by the author that whereas DeLong's experiments

were made in environmental conditions similar to those of the present study. Christophers worked at 25°C. and 83 per cent. relative humidity. His mosquitoes maintained solely on water. These differences, it is suggested, particularly in temperature and humidity, might cause the differences in response to warmth and to moisture which are apparent in comparing the results of Christophers with those in the present paper. D. S. Roberts

BROWN & J. M. New North American Chiggers (Acarina, Trombididae). *Parasitology* 1948 Dec. v. 34 No. 4, 463-78. 14 figs.

HOLSTEIN M. Les sérums précipitants. Fabrication et limitation de leur temps de leur emploi pour la détermination du sang ingéré par les insectes hématophages. [Preparation and Reduction in the Time of using Precipitation Sera for detecting Ingested Blood in Insects.] *Acta Tropica* Basle 1948 v. 5 No. 4 209-28. [74 refs.]

The paper gives a good deal of attention to the history of the development of the precipitin reaction and describes several methods of making specific sera. The author has applied them to the study of blood in lice and bed bugs.

He used several methods for preparing specific sera and appears to have developed a novelty in one respect. Two hours before each inoculation of antigen the rabbit is given an injection of 10 cc. of 10 per cent. glucose in water. It seems that after this procedure the rabbit may be brought into use nine days after the commencement of its course of three injections.

On testing his sera on the remains of blood in lice and bugs which had been fed on man a positive reaction was obtained in *Proclitus* even up to the tenth day after feeding. [This appears to imply that the insects could survive for twelve days without further meals which is indeed remarkable.] In *Cimex* a positive reaction was obtained as late as 30 days after feeding. When louse were tested a few days after feeding positive were obtained even with blood diluted to 1 in 15 000. With both insects the reactions were shown to be specific to human blood for negative reactions were obtained with anti-louse anti-cow and other sera. P. J. Rodin

ROMAN E. & VALIN P. Invasion d'*Ornithodoros* dans une habitation humaine en Haute-Provence. [Invasion by Ticks of a Dwelling-House in Haute-Provence.] *Ann. Parasit. Humaine et Comparée* 1949, 27 No. 34 214-19. 2 figs. 17 refs.

The inhabitants of a farm near Forcalquier (Provence) had occasion to live a move installed in an upper bedroom which was situated just below a pigeon-hoist. This necessitated operations on the ceiling so that there was a communication between the room and the pigeon-hoist. In the floor of the stove, specimens of *Ornithodoros caniseps* (Can.) were found. This tick is uncommon and is a parasite of pigeons.

A number of persons in the house were bitten at night and the bites resulted in very intense pruritus with extensive oedema.

This is the first time that *O. caniseps* has been recorded in Provence.

H. J. O'D. Burke-Gall

BROWNING, H. C. FRANK, F. C., & JENKINS, S. R. GILMAN, I. & DORRIS, M. The Biological Activity of DDT and related Compounds. *Canadian J. Zool.* Sect. D Zool. Sci. 1948 Oct. v. 26 No. 5 503-509. 31 refs.

BROWNING, H. C., FRANK, F. C. & JENKINS, S. R. The Insecticidal Activity of DDT and related Compounds against Different Insect Species. *Canadian J. Zool.* Sect. D Zool. Sci. 1949 Oct. v. 27 No. 5 501-6. 1 ref.

SCHNELLER, G H & SMITH, G B L Unsymmetrical Analogs of DDT *J Amer Chem Soc* 1948, Dec, v 70, No 12, 4057-9 [Refs in footnotes]

TRAPIDO, H The Development of a Sprayer for Use with Water-Suspensions of DDT in Rural Areas of Latin America *Amer J Trop Med* 1948, Sept, v 28, No 5, 721-39, 16 figs on 5 pls

Sprayers originally designed for use with insecticide emulsions and solutions have been found unsuitable for use with water suspensions of DDT, because, among other things, of the sticking of valves and the plugging of nozzles. In practice, time is wasted in putting these right and the cleaning of nozzles and filters with pins and bits of wire results in damage to these parts and the delivery of erratic sprays. Power-driven sprayers are often impracticable and expensive to operate. Experienced mechanics are not always available to repair the machines and hand labour is often cheaper than motor-operated mechanical equipment. Moreover, some houses cannot be reached with truck-mounted power sprayers. What is required is a durable, simple, one-man, hand-operated, knapsack sprayer, capable of efficiently delivering DDT water suspensions.

This paper gives a full description of the basic unit and of the modifications made to it which overcome these disadvantages. The main alterations are the provision of a basket-type filter which is easily accessible and replaceable by hand, without the use of tools, a filler cap by-pass which may be rotated to open or close the sprayer, independent of the hose, by-pass or outlet pipe, a pressure release valve of the automobile type which can be used for releasing air pressure when the liquid has been expended and before the filter cap is opened, and by means of which air pressure can be put into the sprayer from a compressor whenever one is available, a second relief valve which is operated by finger pressure and a combined standpipe, funnel and preliminary filter, which is removable and permits filling of the sprayer to a standard level only, avoids wastage of DDT mixture when filling and screens the material as it enters the tank.

As well as describing the modifications the author illustrates his paper with scale drawings of the parts and photographs. *H S Leeson*

PARR, H C M & BUSVINE, J R A Spinning-Disk Sprayer for applying Residual Insecticides *Ann Applied Biol* 1948, Sept, v 35, No 3, 359-68, 5 figs

Ordinary knapsack sprayers have been found to be very satisfactory for applying residual insecticides to surfaces in dwellings, etc. When using a Kent type sprayer, the fluid is ejected in the form of a rotating hollow cone, which expands, and becomes thinner, forming threads and, finally, droplets. The origin of these droplets in a rotating cone gives them a variety of initial directions, the range of which is determined by their original velocity, depending on the pressure employed, and the size of the droplets. The larger droplets have more momentum relative to their air resistance (surface area) than the small droplets, consequently they tend to travel farther in still air. However, the movement of the cloud of spray droplets soon produces a forward air current which carries along the finer droplets. Therefore, very fine and coarse droplets travel farthest. Spray clouds from 1/16 in and 1/32 in nozzles, when water or kerosene were used at different pressures resulted in the production of droplets which varied considerably in diameter, but whose size mainly lay between 0.1 and 0.4 mm.

By using the spinning-disk apparatus described by the authors, droplets of the same order of size as those from a Kent type sprayer, i.e. 0.1-0.4 mm

diameter can be produced, and by altering the speed of rotation, many droplets of the required size between these limits, can be consistently produced. The apparatus can be used to coat various surfaces up to 1 ft. square or deposits of insecticides in oil solution or in aqueous suspensions or emulsions, and these deposits can be controlled and estimated with a fair degree of precision. As a result it is possible to apply a definite and known amount of insecticide to a surface and to repeat such deposits to within 3 per cent. error at the most.

The apparatus is fully described, and those interested should consult the original for details concerning the construction of the sprayer and the method to be employed when using it.

R. M. GELM

BONART R. M. A Comparison of DDT and Dichlorodiphenyl Dichloroethane as Larvicides for *Aedes* Mosquitoes. *J. Econom. Entom.* 1948 Oct v 41 No 5 834-5

"In laboratory tests with DDT and dichlorodiphenyl dichloroethane in xylene emulsions against *Aedes* larvae collected in salt marshes of central California, the latter compound was found to be two to three or more times as toxic depending upon the concentration used. Also *Aedes squamiger* was found to be much more resistant to both materials than was *A. dorsalis*. Both of these discoveries may have a practical application since (1) dichlorodiphenyl dichloroethane has been considered as a substitute for DDT where danger of residues to man, domesticated animals and wild life is a factor and (2) *A. squamiger* or *A. dorsalis* may frequently be found in pure culture, and can be treated with different dosages of larvicide when so found.

GISSELING J. M. Toxicity of Parathion to Mosquitoes. *J. Econom. Entom.* 1948, Aug v 41 No 4 649-50

Parathion, a new insecticide of German origin is an ester of thiophosphoric acid. It is highly insecticidal (but so dangerous to vertebrates that it is unlikely to come into general use).

The author has tested parathion against *Aedes aegypti*. Parathion as an emulsion diluted in water killed all larvae at a dose of 0.003 of a part per million. Used as a dust the same result was obtained with 1/300th lb. per acre. Quantities of DDT quoted for comparison are ten times greater for the same kill. Pupae are many times more resistant than larvae to both insecticides.

P. 4 BAXTER

DIER, W. H. & SKETCH, W. A. Chemical Constitution and Insecticidal Action. 1. Organic Sulphur Compounds. *Biochem. J.* 1949 43 No 2 441
15 refs.

AIXLE, A. D. & SKETCH, W. A. Chemical Constitution and Insecticidal Action. 2. Substituted α -Aziridinethiols. *Biochem. J.* 1949 43 No 2 473-4
1 refs.

LABORATORY PROCEDURES

LEIBOVITZ, A The Thick Smear Identification of Malaria *Bull U S Army Med Dept* 1948, Dec, v 8, No 12, 956-8

A rapid method for staining thick drops of blood is described —

1 Apply eosin stain for 15 seconds The stain is prepared by adding eosin Y (2 gm) to a buffer solution of 17 gm of dihydrogen sodium phosphate, 5.6 gm of disodium hydrogen phosphate in 1,000 cc of water

2 Wash for 15 seconds in distilled water buffered at pH 7.2

3 Apply polychrome methylene blue for 60 seconds The stain is prepared by placing in a boiling water bath for 1 hour, 2 gm of certified methylene blue (not medicinal), 17 gm of disodium hydrogen phosphate in 100 cc of water Then 5.6 gm of sodium dihydrogen phosphate, 75 cc of methyl alcohol and 900 cc of water are added The mixture is ripened in the refrigerator for a week

4 Wash for 60 seconds in distilled water buffered at pH 6.0, and then for 5 seconds in water of pH 6.8

The advantage of this stain is stated to be that it brings out Schuffner's dots vividly throughout the thick drop It does not apparently stain Maurer's dots, so the method would be of little advantage in the numerous areas where the dominant parasites are *P falciparum* and *P malariae*

P C C Garinham

BARBOZA A Novo metodo de coloração e montagem de hirudíneos, helmintos e pequenos artrópodos [A New Method for Staining and Mounting Leeches, Helminths and Small Insects] *Anais Acad Brasileira de Ciencias* 1948, Sept 30 v 20 No 3, 277-80 3 figs

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

KYLE, J Health Regulations for Air Travel (II) *Brit Med J* 1948, Dec 25, 1115 [Summary appears also in *Bulletin of Hygiene*]

BARRETT [see *Bulletin of Hygiene*, 1948, v 23, 80] has recently discussed various aspects of health regulations for air travel including the international Convention for Aerial Navigation 1944, the vaccines which should be injected and their dosage and certain regulations affecting aircraft and crews He drew attention to the fact that practically all international flights are, from the point of view of quarantine, well within the incubation period of the major epidemic diseases

Kyle has continued these instructions and gives detailed information concerning the diseases against which immunization must be carried out for those travelling by British Overseas Airways (see table)

Doctors are advised to ensure that their patients are in possession of the international form of certificate recommended by the International Sanitary Convention for Aerial Navigation, 1933, as amended in 1944

Passenger Protection Requirements for Specific Routes from England and Return, Including Stopping Places on Each Route (Revised November 1943-1949)

	Y low Fever	Small- pox	Cholera	Ty- phus	Pla- gue	TAD
No. 1 Line—London-Cairo ..	—	Yes	R	R	R	R
No. 1 Line—Cairo-London ..	—	R	R	R	R	R
No. 4 Line—Southampton-Alexandria	—	R	R	R	R	R
Alexandria-Southampton	—	R	R	R	R	R
No. 1 Line—London-Accra	Yes	Yes	R	R	—	R
Accra-London	Yes	Yes	R	R	—	R
No. 1 Line—London-Teheran	—	R	R	R	R	R
Teheran-London ..	—	Yes	R	R	R	R
No. 2 Line—London-Johannesburg	Yes	Yes	R	R	R	Y
Johannesburg-London ..	Yes	Yes	R	R	R	R
No. 1 Line—London-Sydney ..	R	Yes	Yes	R	R	R
Sydney-London ..	R	Yes	Yes	R	Yes	R
No. 1 Line—London-Calcutta	—	Yes	R	R	R	R
Calcutta-London	—	Yes	Yes	R	Yes	R
No. 3 Line—London						
(a) New York ..	(a) —	Yes	—	—	—	R
(b) Montreal and return	(b) —	No	—	—	—	R
No. 4 Line—Southampton-Singapore	R	Yes	Yes	R	Yes	R
Singapore-Southampton	R	Yes	Yes	R	Yes	R
No. 4 Line—Southampton-Iwakuni	R	Yes	Yes	R	R	Yes
Iwakuni-Southampton	R	Yes	Yes	R	R	R
No. 4 Line—Southampton-Hong Kong	R	Yes	Yes	R	Yes	R
Hong Kong-Southampton	R	Yes	Yes	R	Yes	R
No. 4 Line—Southampton-Sydney	R	Yes	Yes	R	Yes	Yes
Sydney-Southampton	R	Yes	Yes	R	Yes	Yes
No. 4 Line—Southampton-Bahrain	—	Yes	R	R	R	R
Bahrain-Southampton	—	Yes	R	R	R	R

"U.S.A. requires passengers from India, Pakistan and Syria to have cholera certificate.

"Japan requires children 1-15 years to be inoculated against diphtheria.

"Yes indicates that the inoculation or vaccination is an essential requirement without which the passenger will be held in quarantine on arrival or may not be permitted to embark.

"— indicates there is no requirement.

"R indicates that owing to the presence of the disease or other circumstances the inoculation or vaccination is desirable for the passenger but it is not an essential requirement.

"Protective inoculations against major epidemic diseases are required as follows: Smallpox for practically all routes. Yellow fever for journeys to

and from West and South Africa *Cholera* for all journeys to and from India and Far East It is also advisable to be protected if *en route* to West Africa and Egypt *Typhus* and *typhoid group* (T A B C) for these diseases protective inoculation is recommended, though not essential on all routes *Plague* for journeys from some airports in the Orient" F O MacCallum

CONGO BELGE Rapport sur l'Hygiène Publique au Congo Belge pendant l'année 1947 par le médecin en Chef de Colonie [Report on the Public Health in the Belgian Congo during 1947] 152 mimeographed pp, 1 folding map and 3 charts

This publication, like its predecessors [for 1946 Report see this *Bulletin*, 1948, v 45, 549] contains a wealth of carefully detailed statistical information and commentaries which one has come to expect in the reports of the *Médecin en Chef* of the Belgian Congo Figures are given for population, demographic distribution, incidence of diseases and deaths and the like over many years—in some cases for as far back as 1928

So complete and detailed a record does not lend itself readily to abstracting, but it may be stated that the seven chapters are presented on the usual lines, namely, (1) general organization and demography, (2) discussion of pestilential, epidemic, endemic and other diseases, (3) medical provision for the indigenous people, which includes that of the well-known Belgian organizations, FOREMI, FOMULAC, FSK, Congo Red Cross, missions, dispensaries and private practitioners, (4) medical teaching facilities provided by Government, missions and other organizations, (5) hospitals, dispensaries and laboratories, (6) port and urban hygiene, industrial hygiene and general sanitation and (7) statistical appendices

The following points are noted as of special interest in 1947 There were 34 cases of *plague* (6 bubonic, 24 pneumonic and 4 septicaemic), with 29 deaths, in the Lake Albert focus and 7 cases (3 bubonic and 4 pneumonic) with 6 deaths in Lake Edward focus Vigorous measures against rats were in operation and 197 896 persons received anti-plague vaccination There were no cases of *yellow fever* or *cholera* In addition to 2,281 cases of *smallpox* with 11 deaths among Africans, there were 4 cases of *variola minor* in Europeans (1 in Léopoldville Province and 3 in Equator Province) Over half a million vaccinations and nearly 2 million revaccinations were done during the year

There were 137 African and 49 European cases of *exanthematic typhus*, with no deaths recorded, 113 of the former and 27 of the latter occurred in Léopoldville Province, where the disease appears to prevail In Katanga, 4 European and 11 African cases of *murine typhus* were reported

There were 3 European cases of *cerebrospinal meningitis* (1 each in the provinces of Léopoldville, Kasai and Katanga) and 248 cases with 121 deaths in Africans Vaccination against the disease was done on a large scale

Twenty-six cases of *trachoma* were seen in Africans in Katanga, where alone the disease seems to be endemic

There were 4 035 European cases of *malaria*, with 14 deaths (0 34 per cent), one-third of them occurring in Katanga Province Thirty-two cases of *blackwater fever* with 9 deaths are reported in Europeans and 27 with 3 deaths in Africans, again Katanga was the area principally concerned Ten cases of *sleeping sickness* occurred in Europeans, with no deaths, 9,289 new cases were recorded in Africans

It is noted that 3 Europeans suffered from *yaws*, and one acquired *leprosy*.

There were 467 Europeans affected with *amoebic dysentery*, with one death and 13,012 Africans with 128 deaths The satisfactory decrease in mortality (0 98 per cent compared with 1 59 per cent in 1946 and 3 51 per cent in 1942)

is attributed to increased use of effective therapy. The problem is being attacked vigorously as far as helminthic infections and it is pointed out that in urban and rural areas alike, the campaign against insect-borne diseases must take account of these conditions.

There were 33 cases of rectal and 32 of vesical schistosomiasis in Europeans; the figures for Africans were 7,539 and 1,174. Filariasis (no further details given) occurred in 433 Europeans and 8,397 Africans.

Six cases of rabies were reported in Africans (5 each in the province of Kasai Katanga and the Eastern Province). There was one case in a European in Kasai (It is stated that this case was *in situ de guérison* and that of 6 African cases only 5 died; this as worded, would imply two recoveries in rabies). It is presumed that these cases were of suspected rabies.

The chapters in the Report which deal with the various medical services are full and informative. It is noted that 67,748 laboratory examinations were made and that 45,408 of these were Wasmann tests.

General hygienic measures such as anti-mosquito measures and destruction of rats are dealt with statistically as are the services provided for workers in various industrial occupations and the conditions from which they suffer.

This report constitutes an excellent account of the medical services in the Belgian Congo during the year.

H. J. O'D. Burke-Gaffney

AFRIQUE OCCIDENTALE FRANÇAISE. Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1946 [DURIEUX C.] [Technical Report of the Pasteur Institute in French West Africa in 1946.] 102 pp. 1948. Dakar. Grande Imprimerie Africaine.

The activity of the different laboratories concerned in this Report followed in the lines of the previous year (this Bulletin 1947: 44, 1948). The total number of specimens examined amounted to 33,817 consisting of 1,711 bacteriological, cytological and parasitological, 13,169 serological, 443 pathological and 2,309 chemical investigations. About half of these were derived from medical organizations in Dakar and the remainder from the Services and other sources.

Altogether over 5 million doses (or cc.) of various biological products were prepared. There were over 4 million doses of yellow fever vaccine produced and over 7½ million people received the vaccine during the year bringing the total now vaccinated by the Pasteur Institute at Dakar up to over 17 million.

The author notes once more the difficulty of keeping white mice for protection tests, and measures are being investigated to improve the housing and feeding of these animals. Nevertheless 337 protection tests for yellow fever were carried out (307 human, 30 animal). Most of the sera came from the main inhabitants of two villages where vaccination against yellow fever had been done systematically four and seven years earlier. 4 specimens were from Europeans who had been vaccinated in various countries. Detailed tables show in the case of the two villages referred to above that between the fourth and seventh year after vaccination the number of strongly positive protection tests fell from 79 per cent. to 51 per cent. while the weakly positives rose from 4.6 to 30.6 per cent. during the same period. The negatives only increased by 4 per cent. The author believes that yellow fever vaccination should be repeated within four to five years if an adequately immune population is to be maintained, and statistical tables in the text support this view.

Positive protection tests were found in 5 of 30 monkeys (*Cynopithecus*) examined. All came from India in 4 cases. Two human sera were examined diagnostically. One in a child gave strong positive result; the other child had been vaccinated against yellow fever. The other in a European

adult who had been vaccinated 7 months before, gave a weak positive result, the patient died and histological lesions of yellow fever were found in tissue specimens. This anomalous case is discussed at length.

A whole chapter is devoted to the subject of rabies vaccine and vaccination. During the year 19,648 ampoules of 6 cc of antirabic vaccine for human treatment and 965 ampoules of 20 cc for veterinary use were prepared. Forty-six treatments were given at the Institute in 1946. The cases treated there and in other centres in 1945 are shown in statistical detail. There were no paralytic accidents and only one death, and this may have been from intercurrent infection.

The remainder of the Report gives detailed statistical accounts and observations on the general laboratory examinations and the diseases encountered. There are a number of short papers on researches undertaken, some of which have already been noted in this *Bulletin*.

The Report is well presented and gives a very informative account of the work of the Institute and its related services. *H J O'D Burke-Gaffney*

PRIDI [? PRIDIE] Report on the Health Services of Iraq with special reference to the Incidence and Control of Endemic Diseases. *J Roy Faculty of Med of Iraq* 1948, July-Oct, v 12, Nos 4/5, 135-42.

This report summarizes in general terms the epidemiological features of the communicable diseases which are of major public health importance in Iraq, it is devoid of statistics. The chief endemic diseases are malaria, tuberculosis, schistosomiasis, hookworm disease, relapsing fever, typhus, trachoma and dysentery.

Malaria—The newly-formed Malaria Institute had the benefit of the basic malaria surveys carried out by the British Army malaria units during the war years. Rural malaria in Kurdistan is conveyed by *Anopheles superpictus* and control measures include residual spraying and anti-larval work. In the areas of the Middle Euphrates drainage and canalization are important. In urban malaria, the "usual methods" are employed.

Tuberculosis—A tuberculosis expert is to be appointed to survey the position and advise the Government, meanwhile a tuberculosis hospital is being built north of Baghdad and will be used as a diagnostic as well as treatment centre.

Schistosomiasis—A very severe recurrent infection of man with *S haematobium* occurs in the Lower Euphrates area, increase in irrigation will make matters worse. Elsewhere in Iraq, distribution of schistosomiasis is patchy but the situation has merited the appointment of a specialist in schistosomiasis to survey the position and advise the Government, the provision of an anti-schistosomiasis institute is suggested where field measures and mass treatments would be organized.

Improvements in water supplies and sanitation are necessary for the reduction of the incidence of hookworm, typhoid and dysentery. Relapsing fever and typhus are prevalent and until the standard of living and personal cleanliness can be raised, anti-louse measures are applied. Trachoma and other infective eye diseases are best dealt with by fly destruction by residual insecticides and the early diagnosis and prompt treatment of cases.

The health and medical services have developed over 25 years to form a "well organised efficient machine" with adequate facilities for training health and medical staff and quite capable of dealing with existing endemic disease. The author recommends that a whole-time professor of public health be appointed at the medical school in Baghdad, and that a principal Matron is necessary for the supervision of the nursing staffs and for inspection particularly

of provincial hospital. He stresses the importance of the close personal contact between the Medical Headquarters in Baghdad and the medical services in the country to ensure as far as possible a well-trained, contented and efficient staff.

R. F. T. M.

SWALE, J. R. H. & MYBURGH, C. A. L. A Sample Survey of the African Population of Southern Rhodesia. *Population Studies* 1948 Dec 2, 1, 3 30-33

CLERC, M. L'évolution dans la protection sanitaire du pèlerinage de la Mecque (Evolution of Sanitary Control of the Mecca Pilgrimage.) (*Pub. Indust. et Sociale*, 1948 Nov-Dec 1, 23 No 6 1949)

Brief reference is made to the important rôle which the Mecca Pilgrimage once played in the dissemination of cholera and other pestilential diseases into the world and the measures imposed by successive International Sanitary Conventions to cope with the evil. The Convention was last revised in 1926. Noteworthy results were achieved. Mecca has been free from cholera for 15 years or so. In recent years the health authorities of the Government of the Hedjaz have made an important contribution to the protection of the health of pilgrims and to the improvement of the sanitary conditions of the city and its population.

The development of air communications has introduced new dangers. Yellow fever has now to be considered a potential danger. That disease is now known to be endemic in territories that extend right across the African continent.

The Epidemiology and Quarantine Committee of the World Health Organization has drafted new regulations for consideration at the next International Sanitary Conference. These proposals include the compulsory vaccination of prospective pilgrims against yellow fever as well as against cholera and smallpox if they come from countries in which yellow fever is endemic. Further studies are recommended concerning the choice of cholera antigens producing a high degree of immunity. Vaccination against typhus fever would not be insisted on, but pilgrims who come from countries in which that disease prevails should be debarked. The Government of Saudi Arabia would undertake to keep all interested Governments informed of epidemiological occurrences during the pilgrimage and during two months before and two months after the event. If the pilgrimage has passed without any outbreak of cholera, plague, yellow fever, smallpox or typhus, north-bound returning pilgrim ships will no longer be required to go to the El Tor quarantine station; they will merely be inspected at Suez.

W. H. H.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES
BULLETIN

Vol 46]

1949

[No 5

SUMMARY OF RECENT ABSTRACTS*

IV TRYPANOSOMIASIS

General Epidemiology

The report on the Inter-Colonial Conference on Trypanosomiasis (p 584), which was convened in Lourenço Marques in 1946, contains much information on the distribution of *Glossina* and the trypanosome diseases of man and animals, methods of control (such as game destruction in S Rhodesia and the use of DDT sprayed by airplane) and clinical subjects. It is not a collection of papers describing new work so much as a series of statements of the position existing at the time. In 1948 a conference on tsetse and trypanosomiasis was held at Brazzaville, and was attended by representatives of the different countries. GEAR (p 770) has written a short general account of this conference.

PINTO (p 1070) reports on a survey of Portuguese Guinea in which 12,443 persons were examined and 248 cases of trypanosomiasis were detected.

Aetiology

FAIRBAIRN (p 50) discusses the results of infecting rats with *T. rhodesiense* taken from man early in the disease, in relation to the types of trypanosomes (as regards length) and their electrical charge. He believes that trypanosomes whose length is above the mean are mature, that they alone can enter into syngamy and produce infection, and that both negatively and positively charged forms are necessary for infection, and he describes the experiments on which these opinions are based. In comment, BROOM makes certain criticisms of the work, and these should be sought in the original.

VANDERPLANK (p 413) infected wart-hogs and elands with *T. rhodesiense*, and showed that the trypanosomes remained in their blood for long periods.

SANDGROUND (p 585) has succeeded, by inoculation of nursing rats, in enhancing the virulence of a strain of *T. gambiense*, and in changing its susceptibility to drugs and its general behaviour so that it became indistinguishable from *T. brucei*. In this state the strain remained stable. He argues that similar changes may take place in nature, and he holds the view, which agrees with the opinion previously expressed by HOARE, that *T. gambiense* and *T. rhodesiense* are mutant strains of a single species which the laws of zoological nomenclature would by reason of priority recognize as *T. brucei*.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 v 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

VAN HOOB *et al.* (p. 303) have studied *T. brucei* in the Belgian Congo where, in areas in which *G. palpalis* predominates, it has been found in dogs, peccary and goats. *T. brucei* is more abundant than *T. gambiense* in the blood of peccary and dogs probably serve as the best reservoir. In dogs it produces a characteristic keratitis, and the dog may therefore be useful in differentiating *T. brucei* from the human trypanosomes. All attempts except one to infect man with *T. brucei* failed. In this one there was transient appearance of the trypanosome in the blood, but they could not be found later. This seems to indicate that some susceptible persons may carry *T. brucei* in nature and that the trypanosome strains, perhaps modified to adapt to man, may be transmitted by tsetse to such people. In some such way perhaps, a mutant strain of *T. brucei* may be produced which could affect man.

SICK (p. 317) reports that two laboratory workers in Switzerland became infected with *T. gambiense* not apparently by accidental inoculation, but by contaminating their fingers with infected blood in the course of their experiments.

Transmission

HEGH (p. 973) has written a useful book on tsetse flies, with special reference to those of the Belgian Congo. VANK (p. 883) has published a booklet on tsetse which would be intelligible to Africans who have had only slight education.

JACKSON (p. 874) has carried a stage further his investigations on a tsetse fly population in East Africa and has noted short-term fluctuations in death rate and birth rates, which cannot be associated with climatic changes but appear to depend on factors in the fly population. Male *G. morsitans* are relatively inactive in the first two weeks of life and during this period their death rate may be low. This has led the author to a re-calculation of the whole male population.

VANDERPLANK (p. 51) shows that if both males and females of *G. swynnertonii* and *G. swynnertonii* are kept together random mating occurs between the species, and the females cross-fertilized produce either sterile eggs or pupae which develop into sterile hybrids. He thinks that this process probably occurs in nature where the two species overlap and that it may be the basis of one means of control. He (p. 244) has investigated the feeding habits of *G. swynnertonii* and *G. pallidipes* in relation to interval between feeds in different climatic conditions. Flies classed as very hungry carry reserves of food and water sufficient for two days or less, those classed as replete carried reserves for a week or more. The periods are shorter when humidity is low or evaporation high.

The same author (p. 413) has studied the incidence of trypanosomiasis in game in East Africa, and records the results of examining a large number of *G. swynnertonii* and *G. pallidipes* for animal trypanosomes.

CHORLEY (p. 771) has obtained evidence that *G. morsitans* and *G. palpalis* are guided by their sense of smell more than is generally supposed, and that the smell of animal dung attracts them.

HORNBY (p. 1068) has written an account of *G. brevipalpis* and the types of vegetation in which it is found in southern Mozambique and of a trypanosomiasis survey of cattle in the same area.

SCHEVETZ (p. 484) reports a survey of Lake Tumba, in the Belgian Congo in which he observed that *G. palpalis* was rare along the shores of the lake but very prevalent along the bank of the rivers that flow into it.

NASH (p. 689) thinks that most sleeping sickness contracted by *G. palpalis* and *G. ticknelli* in Nigeria is transmitted in the late dry season when the temperature is high and when the flies have become restricted to permanent water such as village water holes where contact with man is close. If this is so it may be possible to reduce the length and out-protecting character of river crossing to that required for the dry season only.

The parasite of tsetse pupae, *Syntomosphyrum glossinae*, has been found by NASH (p 245) in Nigeria

GEIGY (p 873) has described his technique for maintaining a culture of *G palpalis* in Europe

Control

BUXTON (p 983) has summed up the known means of controlling tsetse

At a conference held in Nairobi in 1947, under the auspices of the East Africa High Commission (p 982) a resolution was adopted that the method of controlling *G morsitans* by destruction of game should be tested in more varied conditions than exist in S Rhodesia, and in relation to other tsetse flies, but that since clearing of fly is of little value unless full use is made of the land, plans should be made for settlement. Uncontrolled slaughter is condemned. The conference recognized the possibility that bush clearing, or the use of insecticides, or other methods now being studied, may prove better than destruction of game.

VAUGHAN-JONES (p 879) gives a general account of the aims and functions of the Game and Tsetse Control Department of N Rhodesia. In relation to *G morsitans* the Department has used game exclusion or destruction methods and also selective clearing, and the results in general are encouraging.

DU TOIT (p 52) describes the use of DDT smoke, emitted from the exhausts of low-flying aircraft, in the destruction of tsetse flies in South Africa. In this form, DDT will penetrate dense bush. He reports favourably on the method.

SYMES *et al* (p 588) have attempted the control of *G palpalis* by spraying Gammexane or DDT on vegetation once or more than once. In each experiment there was a considerable reduction in fly density for some days, but the numbers of flies soon began to increase. There was much absorption of the insecticides by the vegetation. The authors conclude that the method is not satisfactory.

GLASGOW and DUFFY (p 245) succeeded in eradicating *G palpalis* completely from an isolated stretch of riverine bush in Kenya by hand-catching methods in which teams of boys, with hessian screens, were used. They make the point that hand-catching speedily reduces *G palpalis* to a low density, and would therefore be expected to check an epidemic.

McLEITCH (p 502) has given an account of the methods used to control sleeping sickness in Nigeria since 1925, when the hitherto quiescent disease began to spread extensively. He discusses the clinical types of *T gambiense* infection, noting that the death rate may be high even where the disease appears to be mild. Treatment, which he outlines, is the first step in control, and is carried out by travelling teams and at dispensaries. Control of *G palpalis* and *G tachinoides* by clearing of streams, and in the Anchau corridor, are also described in this paper.

Clinical Findings

HARDING and HUTCHINSON (p 410) describe the *T gambiense* sleeping sickness observed in Sierra Leone, where an unusual form occurs in one area. In this form the trypanosomes are much more commonly found in blood than in gland fluid (which is most unusual in *T gambiense* infections), and the disease is mild even in patients with increased cell count in the cerebrospinal fluid. Although up to one-third of the population had been infected, the population had not decreased. Elsewhere in Sierra Leone the disease is of more usual type.

Noting that most Africans have an erythrocyte sedimentation rate which is higher than the normal for Europeans, HOLLINS and LEWIS-FANNING (p 1070) report on the rate observed in trypanosomiasis of man in Nigeria. Increase in the sedimentation rate is a feature of the disease, and corresponds roughly

with its severity. In trypanosomiasis a low rate indicates early infection or infection of low virulence. The authors think that if in a mass survey patients are found with high rates but in whom trypanosomes cannot be found, they should be given a single injection of antitrypal or pentamidine. If the rate has fallen when they are re-examined a month later they should be regarded as having trypanosomiasis.

HILL (p. 874) gives his reasons for advocating the Skard and Cantaloube method of measuring protein in the cerebrospinal fluid, and makes the point that as different methods lead to very different results, the method used should always be stated. In comment LOURIE states that at the Brazzaville conference in 1948 it was ruled that the upper limits of cell count and total protein (Skard and Cantaloube) for the lymphatic-blood stage of trypanosomiasis should be 3 cells per mm. and 0.025 gm. protein per 100 cc.

LAUCEL and CECALDI (p. 503) have found infection in patients (in West Africa) who had been treated for infections 5-7 years previously. They discuss the question whether these represented reinfections or reactivations after long latent periods but without reaching definite conclusions.

Discussing the transitory neurological signs observed in sleeping sickness, GELFAND (p. 411) describes a case in which the symptoms suggested cryptococcal or tuberculous meningitis, but trypanosomes were present in the cerebrospinal fluid and treatment with trypanamide and pentamidine was successful in removing the cerebral symptoms.

Treatment and Drug Prophylaxis

SCHZ (p. 878) writes of some reactions experienced by a patient being treated with various drugs for sleeping sickness.

It has long been known that Suramin (Bayer 205) persists for considerable periods in the body and that there is no particular tissue which acts as a storage depot. SPURKS (p. 772) has investigated the subject and has confirmed its low and persisting plasma levels. Closely related compounds also persisted, but therapeutic activity was not correlated with persistence. The possible hydrolytic products of Suramin were rapidly eliminated, so that it seems to resist hydrolysis in the body. The paper should be read in the original.

As a result of staining experiments at different hydrogen ion concentrations, SCHTELER (p. 313) concludes that when trypanosomes become drug-resistant there is a significant shift in the iso-electric point of the proteins.

HARVEY (p. 690) discusses the sulphhydryl and disulphide group in relation to arsenic resistance of trypanosomes but without finding a definite relationship which would explain the phenomenon. WILLIAMSON and LOURIE (p. 413) have confirmed the finding of an Hoot that melarsen oxide (which contains a melamine group) is active against arsenic-resistant trypanosomes. They discuss the mechanism of arsenic resistance and the action of the melamine group in the combination of melarsen oxide (and other substances) with the trypanosomes, but their argument should be read in the original. TREVITT and PELLISSIER (p. 877) report the results on a French equivalent of melarsen oxide given by mouth in sleeping sickness at Brazzaville but the period of observation was short. In a second paper (p. 877) they also report favourably on melarsen administered by mouth. Details of dosage are given.

CECCALDI *et al.* (p. 771) have been disappointed with their results in treatment of *T. gambiense* infections with *p-aminophenyl* butyric acid.

VODENOT (p. 181) has analysed the results of treatment of sleeping sickness in French West Africa, with pentamidine and LOURIE has constructed from his text a table showing these results. In high dosage the drug is effective up to but no later than, the time when the infection begins to involve the central nervous system. The author recommends intramuscular doses of 3 mgm. per

kgm body weight, repeated daily or on alternate days for 5 doses, but he used bigger doses in some series. SALEUN and CHASSAIN (p 875) have used pentamidine in French Equatorial Africa, intravenously in hospital but intramuscularly in the field, where intravenous administration to ambulant patients is regarded as too risky. Intravenous doses of 2 mgm per kgm each day for 8-10 days were rather too toxic, but with intramuscular administration even 3 mgm per kgm was not toxic. Pentamidine can be used in pregnancy. The results promise to be good, though the time of observation is short, there was a favourable effect in 26 cases which had proved refractory to other drugs. TRINQUIER and ARNOULT (p 313) also write very favourably of the results obtained in French Equatorial Africa by the use of pentamidine in early *T. gambiense* infections. Cure may be effected within 10 days in early cases, but the drug is inadequate in late cases, though it may be useful in association with trypanarsamide.

HARDING and HUTCHINSON (p 410) write favourably of antrypol and (especially) pentamidine in prophylaxis, they think that general drug prophylaxis is more effective than treatment of cases in checking an epidemic. SALEUN and CHASSAIN (p 878) in French Equatorial Africa report good results after a single intramuscular injection of 4-5 mgm per kgm pentamidine in prevention of infection, for a period of 6 to 8 months.

LAUNOY (p 1071) gives figures displaying the curative and prophylactic effects of pentamidine given subcutaneously to rats, against several species of trypanosomes. Although LAUNOY and JEANPIERRE (p 879) show that pentamidine given by mouth has little prophylactic action in rats against subsequent injection of *T. equiperdum*, LAUNOY (p 1071) reports that an insoluble preparation of pentamidine, when given by mouth to rats, exerts a prophylactic action against subsequent intraperitoneal infection with *T. gambiense*.

VAN HOOFF *et al* (p 412) show that in *T. gambiense* infections in the Belgian Congo propamidine and pentamidine have similar protective and curative properties, but that propamidine is more toxic, giving rise to paresis in some cases. Nervous symptoms could be avoided if propamidine was given intramuscularly. EERAEERTS (p 412) has used propamidine as a prophylactic in the Belgian Congo where he gave intramuscular doses up to 5 mgm [presumably of the isethionate] per kgm for adults. Two injections of the 4 per cent solution were given at an interval of 6 months, and very good prophylaxis was reported. In the dose of 5 mgm per kgm propamidine shows a strong tendency to produce abortion in pregnant women.

Animal Trypanosomiasis

HOARE (p 504) discusses the transmission of pathogenic trypanosomes of man and animals by biting flies other than *Glossina*, and shows that infection of domestic animals by *T. vivax* is a serious problem in some countries in which tsetse flies do not occur. He also discusses the possible relationship between *T. evansi* and *T. brucei* and thinks it possible that the former may have arisen from the latter or vice versa.

The chemotherapeutic activity of cinnoiline derivatives for *T. congolense* infections is discussed by KENEFORD *et al* (p 690). WILDE (p 414) has shown that cattle can be kept in excellent condition in East Africa, in spite of infection with trypanosomes (excluding *T. brucei*) by regular prophylactic treatment with a phenanthridinium compound or with Stibophen. He gives details of the different dosage schedules he used in this work.

CULWICK and FAIRBAIRN (p 313) have found *T. simiae* in two new hosts in East Africa—horse and cattle. They have measured these trypanosomes,

finding three forms which they discuss in relation to their theory of synergy in trypanosomes.

MARSHALL (p. 495) discusses the glucose metabolism of *T. cruzi* in relation to the trypanocidal action of certain drugs but the details should be sought in the original.

KLEINE (p. 689) discusses the control of surra in Russia and of animal trypanosomiasis in Africa.

BRESSANES *et al.* (p. 587) have succeeded in infecting a mouse by injection of a single *T. equiperdum* in one of 36 attempts. They failed with *T. gammas*. Failure to infect was quite common even when 50-100 trypanosomes were injected.

The distribution and rate of metabolism of phosphorus compounds in *T. equiperdum* have been studied by MORACZEWSKI and HILSET (p. 587) but for details the original abstract should be consulted.

HOPE and CHAPMAN (p. 505) give their reason for thinking that hypoglycaemia is the cause of death in albino rats infected with *T. equiperdum*. CHIX and MCCREARY (p. 505) have assayed on *T. equiperdum* the trypanocidal action of arsenical drugs by methods previously used for antimonials. Details should be sought in the original. CHIX and GRILING (p. 691) have been able to show that cysteine hydrochloride inhibits the effect of trivalent and pentavalent antimonials on the glucose metabolism of *T. equiperdum*. KOK (p. 691) has also shown that it inhibits the effect of nitrogen mustard on glucose metabolism. He (p. 773) has investigated the inhibition of certain glycolytic enzymes of *T. equiperdum* by antimonials and arsenicals.

DODD (p. 52) shows that the compound Furacin has a fairly high degree of activity *in vivo* against *T. equiperdum* and against various bacteria, when given as suspension by stomach tube. HARVEY and EVANS (p. 52) demonstrate that this drug has only a low degree of toxicity.

ERCOLE and WILSON (p. 773) show that BAL not only interferes with the toxicity of nitarsen but it also (and much more strongly) interferes with its therapeutic activity against *T. equiperdum*. A combination of the two substances therefore would not be suitable for treatment.

CALDWELL and GRÖGGS (p. 417) show that in rats maintained on a diet deficient in biotin, and infected with *T. lewisi* there was intense and prolonged infection. The effect of biotin deficiency is probably to cause diminution in the production of albumin and trypanolysin. TAYLOR and BECKER (p. 77) describe the liver changes observed in rat fed on a diet deficient in pantothenic acid and infected with *T. lewisi*. Such rats develop very heavy infections.

Chagas's Disease

DIAS (p. 1077) gives a general account of Chagas's disease in South America.

Chagas's disease has been found in many of the municipal district of Rio Grande do Sul, Brazil and carried by *Triatoma feda* (p. 11). TOFFI (p. 415) discusses the clinical features of the disease. It is seen in this area. HOWE (p. 415) found up to 23 per cent of people infected with *T. cruzi* in part of Bolivia where *T. feda* was the only known vector. Infection was also present in some dog and cat examined.

TOMIE and RYAN (p. 889) have grown *T. cruzi* in a dialysate medium. MATES and VARELA DE OLIVEIRA (p. 889) have cultivated *T. cruzi* in tissue culture and have observed that the entire cycle takes place in one cell. The paper should be read in the original. An autocatalytic medium, free from cell and coagulable protein, and in which *T. cruzi* can be cultivated, is described by DE FREITAS and DE CASTRO (p. 1073).

HACHENHA (p. 415) has compared the susceptibilities of male and (male) mice to various strains of *T. cruzi*.

MUNIZ *et al* (p 55) attempted to immunize monkeys with killed cultures of *T. cruzi*, but without success

MAZZOTTI (p 163) found natural infection with *T. cruzi* in *Triatoma protracta* *woodi* and *T. gerstaeckeri* in Mexico. A new species, *Triatoma delponte*, has been found infected with *T. cruzi* in nature, by ROMANA and ABALOS (p 314)

DE FREITAS (p 315) reviews the laboratory methods of diagnosis of Chagas's disease, which include xenodiagnosis, animal inoculation with blood from the patient, haemoculture, and the complement fixation test. He quotes a considerable amount of his own original work, and concludes that xenodiagnosis is the best diagnostic procedure, and that the complement fixation test is very useful, the other two procedures gave poor results. MUNIZ (p 54) describes a precipitin reaction which is particularly valuable in the early stage of Chagas's disease before definite symptoms appear. It is not very useful in chronic cases.

PELLEGRINO and MESQUITA (p 506) show that false positive reactions to the complement fixation test for *T. cruzi* infection may be given if sera are stored in the ice-chest before the test is performed, but that these false positive results can be avoided if the test is carried out on fresh specimens.

ROMANA and GI (p 316) refer to artificial xenodiagnosis, the patient's blood being drawn into a tube which is then covered with animal skin. The bugs bite through this skin and take in the blood. The test is useful if for any reason it is impossible to have the patient bitten directly by the bug.

DEANE (p 417) shows that Triatomid bugs are often found to be infected with *T. conorrhui*, which may lead to confusion in xenodiagnostic tests unless the flagellates are tested by injection into laboratory animals [which seems to be a most important fact].

MUNIZ and DE AZEVEDO (p 416) report experiments which indicate that there is an allergic condition in the pathogenesis of Chagas's disease.

POUDÉ *et al* (p 314) have performed the xenodiagnostic test and a complement fixation test on certain patients passing through the cardiology department of a hospital in Bahia, Brazil, the patients showed signs or symptoms which suggested Chagas's disease, and this was confirmed by one or the other of these tests. The symptoms of cardiac disease associated with Chagas's disease are described. POUDÉ (p 1074) found partial auriculo-ventricular block in 6 of 40 patients with Chagas's disease, and total block in 11. He describes other changes detected by electrocardiography in this series of cases. LARANJA *et al* (p 589) describe the electrocardiographic changes in Chagas's disease, and give details of the variations from normal which they observed. VALLS (p 416) made an electrocardiographic study of a considerable number of patients proved to have Chagas's disease having first excluded those with cardiac conditions due to other causes. Apart from a few cases of A-V block, the lesions found were slight and there was little impairment. Most of the patients were young. ROMANA (p 316) reports cases of chronic myocarditis and of encephalopathy due to Chagas's disease.

In Venezuela, PIFANO *et al* (p 1072) have cultivated *T. rangeli* from the blood of a girl suspected of Chagas's disease, and describe its characters.

Charles Wilcocks

MALARIA

PAMPANA, E. *Malaria in Europe 1938-1947. Epidemiological & Vital Statistics Rep WHO* 1948, Nov, v 1, No 18, 392-400 [Refs in footnotes]
[In parallel French & English]

[This is an interesting summary of all available information regarding the incidence of malaria in all European countries except Russia during the decade

which included the war years. The information is inevitably very incomplete but sufficient to justify the conclusion that outbreaks of malaria attributable to war conditions were much less widespread and severe than those which followed the 1914-18 war. The end of World War II coincided with the introduction of DDT as a residual insecticide. It is justifiable to conclude that they contributed materially to a lower malaria incidence than could reasonably have been expected.

FISCHER, L. Einheimische Malaria und Anophelesmücken in der Nachkriegszeit (Indigenous Malaria and Anopheles in the Post-War Period.) *Dtsch. med. Woch.* 1948 Nov. 8 v. 73 Nos. 41/4, 815-18, 3 figs. [1 ref.]

The article reviews briefly the past and present incidence of indigenous benign tertian malaria in Germany. In considering, with special reference to south Germany, the possibility of continued outbreaks the author discusses climatic factors, the habits and distribution of the *mosquitoes* and *typical* races of *Anopheles maculipennis*, the influx of gametocyte carriers, and the living conditions of the people under normal circumstances and as a result of the recent war. More importance is attached to *mosquitoes* than to *typical* as a potential vector. It is considered that limited foci of malaria may continue to occur where, as a result of the war, there is sufficiently increased contact between man and mosquitoes, but that mosquito destruction and amelioration of conditions should soon eliminate such outbreaks.

HOFMANN, R. Ein Beitrag zur Geschichte, Klinik und Epidemiologie der Malaria in Oberschlesien. [Malaria in Upper Silesia.] *Offenb. Gesundheitsdienst* Leipzig 1943 Apr., v. 9 Nos. 7/8 A 137-43 7 figs. [10 refs.]

Malaria—or rather fever which almost certainly was malaria—has existed in this district since 1870 though cases then were very few. From 1890 onwards the numbers increased rapidly—due to a large increase of small unimportant foci. In 1913 there were 100 cases reported. In 1917 862 and during this period, 1913-17 there were 2,149 cases reported. In the Bielefeld district, the infection is almost exclusively benign tertian. In Pless, malignant tertian has been found in several places and a few quartan infections. Clinically the disease is usually mild, cachexia is rarely seen. The vector is *A. maculipennis* and nearly all *mosquitoes*. Of 21 foci mentioned in which the mosquitoes were captured in byres, cellars and dwellings, in two the species is not stated, in one *A. typicus* alone was caught, in one *typicus* and *mosquitoes*, in the other 17 *A. maculipennis* only.

KLOSE, F. & EISENTRAUT, M. Das Auftreten der Malaria in der Provinz Brandenburg im Jahre 1942. [Malaria in Brandenburg Province in 1942.] *Offenb. Gesundheitsdienst*, Leipzig 1943 Nov. v. 9 Nos. 21/22, 1325-9.

In 1942 malaria became prevalent among prisoners of war in Brandenburg Province. The prisoners treated numbered 5,565 of whom 2,213 were Yugoslav, 1,815 French, 1,300 Russians and 237 British. Plasmosquine 0.41 gm. thrice daily for three days after two days of atabrin [mepacrine] 0.1 gm. twice daily were the drugs used and the results are stated to have been very good. There were among the Yugoslavs there were 353 cases between May and December 1941 but only 5 in the whole of 1942. During this year (1942) there were almost only 103 cases—the 5 Yugoslavs just mentioned, 63 Russian, 34 British and 7 French.

Among German soldiers serving abroad, those in Russia suffered more 8.6 per cent. in the northern theatres of war, 14.3 in the middle, 24.4 in the

southern and 14.1 per cent in unspecified places at the front. Two-thirds were first attacks, one-third were relapses. It is said that only 82 cases altogether occurred among the non-military population: 10 Germans, 23 Russians, 17 Croats, 12 Jugoslavs, 8 Ukrainians, 4 Hungarians, 2 Bulgars and one each of Italian, Slovene, Dutch, Belgian, French and Spanish. A list is given of nearly a score of places in the Province where conditions favour the development of *Anopheles*.
H. Harold Scott

REV SANIDADE HIG PUBLICA—1946, Sept & Nov, v 20, Nos 9 & 11, 917–69, 1114–77. Estadística de los Dispensarios Antipalúdicos dependientes de la Dirección General de Sanidad [Statistics of Antimalaria Dispensaries of the Central Health Administration]

These statistical tables concern cases of malaria, fresh infections, diagnosed in each of the antimalaria dispensaries in each of the Provinces of Spain during the years 1944–45 and 1945–46 (1st June to 31st May). Tables record the incidence in five age groups, the incidence of *P. vivax*, *P. falciparum* and *P. malariae* infections, and the monthly incidence of each species of infection. The total number of new infections recorded in Spain in 1944–45 was 163,994, in 1945–46, 89,847. Of the latter 84,838 were *P. vivax*, 4,894 *P. falciparum*, 60 *P. malariae* and 55 mixed infections.
Norman White

JERACE, F. La malaria nell'Agro Romano nel quinquennio 1943–1947 [Malaria in the Agro Romano 1943–47]. *Riv di Malarologia* 1948, June, v 27, No 3, 103–10, 1 fig & 4 graphs. English summary (9 lines)

This is a description of the severe epidemic of malaria that afflicted the Agro Romano in 1944. The Agro Romano is the territory that is subject to the administration of the Rome Municipality. It extends to and includes 48 kilometres of the coast line of the Tyrrhenian Sea and has a population of some 250,000. Malaria is endemic everywhere west of Rome, more particularly near the coast, but energetic measures before the war had brought the disease under control. In only two of the years between 1933 and 1943 inclusive did the annual notification of malaria cases exceed 2,000. In 1944, 9,063 cases were recorded of which 7,986 were primary infections: the highest monthly incidence was in August, 2,433. War damage, the suspension of malaria control measures, the immigration of troops many of whom were infected with malaria, the introduction of new strains of parasites, the scarcity of antimalaria remedies, and forced movements of the population were all important factors in contributing to the severity of the outbreak. In 1945, the total number of cases recorded rose to 11,025, of these, however, only 2,965 were primary infections. Thereafter there was rapid improvement. In 1947, only 495 cases were notified. During the first five months of 1948, only 78 cases were found: all of these were relapses and 45 were imported cases. DDT, which was first used in 1944, has contributed much to the noteworthy success of the control campaign.

Norman White

BALZAR, M. Il pericolo della malarioterapia praticata in zone con anofelismo [Danger of practising Malaria-Therapy in Anopheline-Infested Areas]. *Riv di Malarologia* 1948, Apr, v 27, No 2, 65–70. English summary (7 lines)

In the Provincial Mental Hospital at Vercelli, the treatment of neurosyphilitic patients with malaria therapy was started in 1938, at first by inoculation of infected blood and later by mosquito transmission. Nothing untoward happened till 1943 when 33 cases of locally acquired *P. vivax* infection occurred among

the inmates and staff of the institution and 7 cases among the nearby tribal huts of Verelli. In the two following years the numbers of primary infections were 53 and 8 and 131 and 12. The anopheline density in these years was probably much increased. The scarcity of food was such that rice cultivation was allowed close up to the inhabited parts of the town. The scarcity of materials and disorganization generally arising from the war prevented the application of prompt measures of control. In 1946 the hospital buildings were treated with DDT with excellent results. In that year only four fresh infections were acquired in the hospital and only 6 in the vicinity. The author concludes that malaria therapy should not be practised in areas in which vector mosquitoes are prevalent unless supplies of DDT are available for the adequate disinsection of at least the quarters in which the patients in question are housed.

Verma Mitr

SCHWITZ J. Notes on Endemic and Acute Malaria in Central African Kaffirs. *Trans Roy Soc. Trop Med & Hyg.* 1949 Jan. v 43 No. 4 403-8.

In endemic malaria areas in Central Africa, parasite rates are much higher among African children than among African adults. In children *P. falciparum* dominates but *P. malariae* and even *P. vivax* infections occur with gametocytism of all three species. In adults only trophozoites of *P. falciparum* are found with occasional rare crescents. In hyperendemic areas, the peak of infection is reached at the age of 1 to 2 in hypoendemic areas at from 5 to 8 years. In the latter the *P. malariae* infection rate is low and *P. vivax* is very rare.

In infants, congenital malaria has not been found. *P. falciparum* appears first, later *P. malariae* and last *P. vivax* infections.

In endemic areas the diagnosis of fever of malarial origin may be difficult; the parasites may only be commensals. The macroscopical blood picture can be a useful aid to differential diagnosis. In endemic malaria, large and somewhat thick trophozoites in cells with specific alteration (deeper coppery colour and Stephens-Maunder dot) are characteristic. In acute malaria more trophozoites are found which have not yet been able to cause alterations in the red cells.

In high plateaux of Central Africa, epidemic malaria sometimes occurs. In epidemic malaria adults and children are infected in like proportion and both groups may show parasites of *P. malariae* and even of *P. vivax*.

Verma Mitr

Hsu, Kuo-Chin. Malaria in Southern and Western Szechwan with a Note on the Occurrence of *Schistosomus japonicus*. *Chin Med J. English Ed.* 1948 June v 68 No. 6 319-23. 20 refs.

This is a record of a journey made in the south west part of Szechwan. In each of nine localities children under 12 years of age were examined. Blood smears from all children with splenic enlargement were examined. Enquiries were made from local medical practitioners regarding the incidence of malaria. Collections were made of anopheline larvae.

Malaria was very prevalent in Suifu where spleen index of 28.5 was recorded in 1939 it was only 6.1 per cent. The movements of troops and refugees contributed to the increased prevalence which was specially marked after the completion of the aerodrome. *P. falciparum* infections became much more numerous. Of 1189 positive blood smears 68.6 per cent contained *P. vivax*, 28.6 per cent *P. falciparum* and 2.8 per cent *P. malariae*.

A. hyemalis var. sinensis was the most prevalent anopheline. It was found breeding in rice-field, slowly moving streams, stagnant ponds and in a variety

of collections of casual water. Other species found, in small numbers, were *A. minimus*, *A. palloni*, *A. barbirostris* and *A. hyrcanus* var. *ingerrimus*.

The author found a boy suffering from *Schistosoma japonicum* infection. *Oncomelania* snails were found in many places. Ankylostomiasis was very prevalent.

Norman White

MIYAO, I., TAKEI, H., HATORI, J. & NODA, H. Investigative Studies concerning Malarial Infection among the Natives of Kainanto. *Kitasato Arch. Exper. Med.* 1942, Aug., v. 19, No. 2, 73-84. [21 refs.]

HERNÁNDEZ LIRA, P. Algunos aspectos de la epidemiología del paludismo en el nordeste de la República Mexicana. [Epidemiological Aspects of Malaria in the North-Eastern Part of Mexico.] *Bol. Oficina Sanitaria Panamericana* 1948, Aug., v. 27, No. 8, 699-705. English summary.

This is a short description of a malaria control programme intended to cover an area of north-east Mexico, triangular in shape the points of which are the three towns Matamoros, Nuevo Laredo and Monterrey. Work has been started in Monterrey, an industrial city of 232,000 population. The Antimalaria Dispensary of Monterrey report that the average annual incidence of malaria cases during the last five years has been 550. The examination of 1,500 school children gave a spleen index of only 3 per cent. Malaria parasites, *P. vivax*, were found in only 1.9 per cent of 2,000 films examined.

The more important breeding places of anophelines in the city are listed. Four species of *Anopheles* have been identified: *A. pseudopunctipennis*, *A. punctipennis*, *A. quadrimaculatus*, and *A. albimanus*. *A. pseudopunctipennis* is the most prevalent especially during the months June and July, and from September to November inclusive. A private company has undertaken considerable engineering work designed to eliminate mosquito breeding, and DDT has been used extensively. When the work in Monterrey is completed Matamoros will receive similar attention.

Norman White

DUBIN, I. N. A Search for Exoerythrocytic Forms in Human Malaria by means of Tissue Cultures of Bone Marrow. *J. National Malaria Soc.* 1948, Dec., v. 7, No. 4, 330-32.

"In a search for exoerythrocytic forms in human malaria, tissue cultures were made from the bone marrow of patients with sporozoite-induced infections, both in the pre-patent period as well as after development of parasitemia. This was done in *P. falciparum* infections in 6 instances and in *P. vivax* infections in 20 instances. No exoerythrocytic forms were seen in the cultures."

WACKERLAS, M. J. & ERCOLE, O. N. Observations on the Development of Human Malarial Parasites in the Mosquito. I. Morphological Changes. *Australian J. Exper. Biol. & Med. Sci.* 1948, Sept., v. 26, Pt. 5, 439-47, 2 figs. & 1 coloured pl. [17 refs.]

This is an account of the development of *Plasmodium vivax* and *Plasmodium falciparum* of Melanesian strains in *Anopheles punctulatus punctulatus*.

The preparations for study were made from mosquitoes fed on gametocyte carriers and dissected at varying intervals after the blood meal. The preparations so obtained were air-dried and stained by Leishman's stain.

Material at late stages in the infection was examined in fresh preparations or after fixation and staining by various standard methods.

The events in sporogony are described on familiar lines and speculation is made as to whether the two masses of chromatin often seen in the female

gametocytes indicate meiotic division preliminary to fertilization or when they are the male and female nuclei prior to fusion.

Development of the ookinete and the oöcytes on the outer surface of the gut wall is described, but no new facts are brought out. The growth of the oöcyte under similar conditions was said to be more rapid in the case of *P. vivax* than in that of *P. falciparum* sporozoites entering the glands two or three days earlier in the case of the former parasite.

Infected mosquitoes kept for any length of time showed a steady decline in sporozoite content even when they were fed on carbohydrate food only.

H. E. SHAW

MACKERRAS M. J. & ERCOLE Q. V. Observations on the Development of Human Malarial Parasites in the Mosquito. II. Factors Influencing Infection. *Australian J. Exper. Biol. & Med. Sci.* 1943, Sept. v 20 Pt. 3 413-54, 2 figs.

An attempt is made to assess the influence of various factors on the infections produced in anophelines fed on gametocyte carriers of *Plasmodium vivax* and *P. falciparum*.

The probable number of gametocytes ingested by the mosquito is first considered and then the findings in each of the two species are considered separately.

P. vivax.—The results obtained in infecting mosquitoes were often contradictory and no factor relative to either insect or plasmodium could be demonstrated as the cause of greater or lesser infection rates in the mosquito.

P. falciparum.—Here again equivocal results seem to have been obtained and the curious inference is drawn that immature gametocytes can produce oöcytes but that these do not develop normally as will be evident from the following quotation—"these gametocytes were of the usual crescentic shape, but many were apparently immature as large numbers of the cysts which formed died before reaching maturity and the sporozoite rate of the hatch was only 42 per cent."

The case of one patient is described where gametocytes of *P. falciparum* consistently failed to infect mosquitoes and this is put down to "some inherent functional peculiarity the cause of which is quite obscure. [There would appear to be at least the possibility that some other less obscure cause was operating, such as the surreptitious use of paludrine.]

The causes responsible for reduction of viable gametocytes in the first 24 hours after the mosquitoes' blood meal are considered, such as the well-known phenomenon of phagocytosis. The description given of one batch of mosquitoes which were fed on a *P. vivax* gametocyte carrier in which the mosquitoes showed numerous minute brown spots on the gut wall. These are interpreted as representing the points of penetration of the gut wall by vermiforms which later failed to form oöcytes. This seems improbable.

H. E. SHAW

SAUNDERS, G. M. TALMAGE D. W. & SCOTT V. The Use of *Plasmodium vivax* Preserved by Freezing in Inducing Malaria. *J. Lab. & Clin. Med.* 1943, Dec., v 33 No. 12, 1579-87.

The therapeutic use of malaria continues to be so widely practised that any easy method of maintaining a strain over long periods without the use of human subjects would be of great advantage.

It was for this reason that the method here described was worked out and tested. Blood from malarial donor was collected and prevented from clotting

either by mixing five volumes of blood with one volume of 4 per cent sodium citrate, or by defibrinization

The blood was next transferred to thin-walled glass ampoules in two to four ml amounts and these were sealed in a flame. The contents were next rapidly frozen by immersion of the ampoules in a freezing mixture of ethyl alcohol and dry ice at -70° to -80°C . By rotating the ampoules individually freezing was complete in a few seconds and the ampoules were then stored in dry ice at -70°C . For use, the ampoules were rapidly thawed at the bedside by immersion in a water bath at 40°C and the contents immediately inoculated intravenously, two or three ampoules being used for one inoculation.

Results—Successful transmission of malaria was obtained after more than five months storage of blood and the overall success rate in 46 subjects was 87 per cent [40 subjects]. The possible causes for the failures are discussed, such as previous malarial infection, race, inadvertent use of antimalarial drugs, the stage of the malarial parasites when frozen, and other factors.

There was no significant difference in the results obtained with defibrinated and citrated blood, nor did the length of storage appear to affect the results.

The average incubation period was 12.4 days, somewhat longer than after direct transfers of blood but the clinical course of the resulting malarial infection differs in no way. The preservation technique caused haemolysis of the red cells, thus freeing the parasites, which showed poor staining reactions but no untoward results attributable to the inoculations were seen in patients.

H E Shortt

MACKERRAS, M. J. & ERCOLE, Q. N. Observations on the Life-Cycle of *Plasmodium malariae* Australian J. Exper. Biol. & Med. Sci. 1948, Nov., v 26, Pt 6, 515-19, 3 figs.

Although quartan malaria is widely distributed throughout the tropics, much less is known about its life history than that of the other malaria parasites. Melanesian strains in particular have been little investigated and this paper remedies the defect to a small extent. A number of *Anopheles punctulatus punctulatus* were allowed to feed on a carrier of *P. malariae* gametocytes in New Guinea and were then sent to Cairns, Australia, where they were kept at 73°F . Oöcysts, 25μ in diameter, were present on the 16th day. These cysts showed the typical distribution of fine black pigment in double lines. A light infection of sporozoites reached the glands by the 31st day or slightly earlier. At this same temperature, *P. vivax* takes 15 to 16 days and *P. falciparum* 18 to 20 days.

Five mosquitoes of this batch were still alive on the 24th day and for the next 10 days they were given an opportunity to feed on a volunteer who actually received 11 bites during this time. Three of the five mosquitoes harboured sporozoites. Parasites were first seen in the man's blood 24 days after the first bite, symptoms of the disease started a fortnight later still. Two other volunteers received inoculations of blood containing the infection. All three cases were mild and the parasitaemia did not exceed 2,300 per cmm. Gametocytes were first seen 23 days after the appearance of trophozoites, they were never numerous and they proved uninfecive to mosquitoes.

The morphology of the parasites was studied in one of the two blood-infected volunteers who exhibited a typical quartan fever. By 24 hours the parasites contained pigment and were "amoeboid" in shape. By 48 hours the trophozoite almost filled the blood cell and division of the chromatin had started. By the 64th hour, division of the chromatin was completed and the pigment had aggregated. Merozoites numbered 5-10 the average being 8.

[It will be noted that this Melanesian strain shows few differences from the classical form.]

P. C. C. Garnham

GAUD J Rythmes saisonniers d'activité d'*A. maculipennis* et d'*A. claviger* au Maroc en fonction de l'altitude. [Seasonal Breeding of *Anopheles maculipennis* in Morocco in relation to Altitude.] *Bull Soc Path Ex* 1948 v 41 Nos. 7/8 494-8 1 map & 1 graph.

The behaviour of *A. claviger* and *A. maculipennis* var *labr. achasi* was compared in the plains and mountains of Morocco. The latter species constitutes more than 80 per cent. of the total anopheline population and is the principal vector of malaria. Both species breed in slowly running water rich in vegetation in fact the same breeding places are used by the two mosquitoes. In the mountains *A. claviger* is first found alone then the two are found together during the hot season and later *A. maculipennis* disappears. Below 500 m. development of *A. maculipennis* continues throughout the year at 1,000 m. it is for only for six months and above 1,500 m. only for four months. The breeding of *A. claviger* is also influenced by altitude its upper limit is well above 2,000 m. and its lower limit in the summer months is about 1,000 m. The author suggests differential control by larvicidal measures as opposed to permanent work based on these observations. P C C Geraud

TAKI H Experimental Studies concerning the Growth of Anopheles in Sea Water in Katsuta. *A. Iwate Arch Exper Med* 1944, Aug v 10 No 2 103-8.

1 We observed the growth of anopheles larvae in sea water

2. Many species of anopheles are found in the southern district of Katsuta but only *A. agus* hatched.

ROBERTS J I A Parasitological Survey of African School Children in Nairobi Schools with Haematological Results of Malarial Infections. *J Trop Med & Hyg* 1949 Feb v 5 No 2, 31-3.

A survey was carried out on African school children living in Nairobi, Kenya who belonged to several tribes. The results are given in four tables. About a quarter of the children showed malaria parasites in their blood and three-quarter had intestinal helminths. The malaria was chiefly caused by *P. falciparum* though *P. m. lariae* (4 per cent) and *P. m. s.* (0-24 per cent) are occasionally seen. Helminths included species of *ascaris*, *Ascaris lumbricoides*, *Tenon* and *Sci. stenosoma* in that order of prevalence. *E. lamblia* & *stolytica* was found in 5 per cent of the children.

Fifty children suffering from malaria were investigated haematologically. The average red blood count was 2,650,000 per cmm. the haemoglobin 8.4 gm., and the total white cells were 19,000 per cmm. including 2 per cent pigmented forms. It is stated that the diet of these children was comparatively poor in the haemoglobin-producing element. P C C Geraud

ROBERTS J I A Comparison of Haematological Results in Europeans and Africans suffering from Active Malaria. *J Trop Med & Hyg* 1949 Nov v 51 No 11 228-34.

A study was made of the effect of malaria on the blood of patients during an epidemic of the disease in the town of Nairobi, Kenya Colony. 200 Africans and 100 Europeans were observed and an attempt was made to assess the degree of disability arising from the anaemia caused by the infections. The malaria was chiefly due to *P. falciparum* and medium or light infections were commonest (in four fifths of both the European and African groups). The author states however that the numerical prevalence of parasites is no guide to the severity

of the case, even in cerebral malaria the peripheral blood and brain often harbour few parasites [No evidence for this oft repeated statement is provided] The anaemia was measured by the amount of haemoglobin (by the Hellige acid-haematin haemometer) and by the number of red blood corpuscles

Normal figures [see also Haematology, below] for males at the altitude of Nairobi (5,500 ft) are stated to be between 18.7 to 21.25 gm per cent haemoglobin and $5\frac{1}{2}$ and $6\frac{1}{2}$ million red blood cells. African cases of malaria gave an average percentage of haemoglobin of 11.56 gm and 3,387,000 erythrocytes, Europeans, 13.09 gm haemoglobin and 3,860,000 erythrocytes. The two races differed in the number of cases occurring within the normal haematological range, viz 46 per cent of Europeans but only 21.5 per cent of the Africans. The two races differed also in other respects, pigmented leucocytes occurred in 22 per cent of the Africans and in only 4 per cent of the Europeans. Immature blood cells were about four times as common in Africans, the white blood count was significantly higher in Africans (about 13,000 as compared with 8,000) and included many myelocytes. The mononuclear count was found to be little guide to the diagnosis of malaria, in normal Africans, it was found to be 6 per cent, in cases of malaria 8 per cent with very wide variations.

[The author concludes that an appreciable degree of disability arises from the malarial infections, even though the parasitaemia was low. Two queries suggest themselves: was malaria the only cause of the anaemia, and how permanent were the effects?]

P C C Garnham

MASSIAS, C & HAO N D. La cirrhose atrophique du foie paludéenne [Atrophic Cirrhosis of the Liver in Malaria] *Bull et Mém Soc Méd Hôpité de Paris* 1948, Nos 24/25, 826-30 [26 refs]

The authors observed many cases of ascites in highly malarious areas of French Indochina. The clinical picture was that of Laennec's cirrhosis associated with pronounced cachexia and often with well-developed collateral circulation. Autopsies were carried out in some cases and disclosed small hard brown or yellow livers, the dominant lesion in which was annular sclerosis dividing the parenchyma into islands of cells which showed signs of degeneration or hyperplasia or both.

The authors consider that malaria was an aetiological factor of importance in the pathogenesis of the liver lesions. This opinion is based on the exclusion of certain other possible aetiological agents, including alcohol. The authors admit, however, that many other factors, such as nutritional status, may be equally involved.

An unconvincing survey of literature on the subject is given.

B G Macgregor

MONAPATRA G S. Cerebral Symptoms in Benign Tertian Infection. *Indian Med Gaz* 1948, Sept, v 83, No 9, 412-13.

This note refers to a Hindu child of 4 years who was admitted to hospital suffering from a daily pyrexia and rigor, spastic paralysis and aphasia. The spleen was enlarged and palpable. The blood showed 65 per cent haemoglobin and 3,380,000 erythrocytes per cmm.

At the height of the fever on the first afternoon and also on the next day, benign tertian malaria parasites were found in the blood. Careful and repeated examination failed to show subtertian parasites.

The child reacted promptly to intramuscular quinine (after two days on alkalis only, so that the blood slides could be studied). The afternoon fever and rigor stopped on the fourth day and that night the child spoke a few words, and spoke freely next morning. Oral quinine was continued. The child could

The average time of disappearance of the acute attack was 29.14 hours for *crax* and 31.2 hours for *falci-parum* infections.

The *crax* gametocytes disappeared in all the cases noted. They were present originally in 7 cases.

The *falci-parum* gametocytes disappeared in only one of 4 treated cases in which they were present.

There were no cases of severe intolerance to the drug requiring suspension of treatment.

H. J. O'D. Burke-Gaffney

LOZANO MORALES, A. La terapéutica del paludismo por la metoquina. [Treatment of Malaria with Metoquina.] *Rev. Sanidad e Higi. Públ.* 1947 Nov. v. 20 No. 11 1108-11

This is a report of the treatment of 58 patients suffering from *P. vivax* infections with Metoquina (prepared in the Winthrop Laboratories, New York). The duration of the treatment was 5 days. The dose for patients 8 years of age and over was 0.3 gm. (3 tablets) a day. Parasites disappeared from the peripheral blood within 36 hours average maximum 48 hours. All patients were free from fever on the third day of treatment. Thirteen of the 58 patients had relapses: there was no relapse within 30 days of the end of treatment. It is concluded that metoquina is very effective in the treatment of infections with Spanish strains of *P. vivax*.

Veronica White

SANDROTTI, G. Relazione sugli esperimenti di terapia della malaria con il prodotto "Paludil". [Treatment of Malaria with "Paludil".] *Rev. di Malariologia* 1948, June, v. 77 No. 3 123-9. English summary (6 lines)

Paludil is the name given to Italian-made paludrine. Nine patients with *P. vivax* and 2 with *P. falci-parum* infections were treated with this drug in the Institute of Malariology, Rome. The conclusion is reached that paludil is at least as effective as the acridine derivatives and as quinine in the treatment of malaria.

Veronica White

PATEL, J. C. & MENTA, J. M. Clinical Trials of "Cam-Aqi" in Malaria. *Indian J. Med. Sci.* 1948, Nov. 2, No. 11 675-9

This paper reports the treatment with CAM AQI of 39 patients suffering from malaria in Bombay. Nine had *P. falci-parum*, 22 *P. vivax* and 8 had mixed infections. Some patients received 50 mgm. every 1 hour for 48 hours five doses in all; other received a single dose of 250 mgm. The average duration of fever was 55.9 hours after the commencement of the divided dose treatment and 32.2 hours after the administration of the single dose. Parasites disappeared from the blood within 62 hours (average) in both forms of treatment. The drug appeared to have no action on gametocytes. Twenty patients were observed for 4 months: five of these had relapses after attack periods ranging from 11 to 45 days average 31 days.

(For information regarding the chemical composition of CAM AQI and other clinical trials see this Bulletin 1948 v. 45, 39 and 1947 v. 44 (Feb).)

Veronica White

MENEZES, R. M. & ROSADO, P. N. S. Experiência com novos medicamentos contra a malária no programa da Amazônia. [Experiments with New Antimalarial Drugs in Amazonia.] *Rev. Serviço Especial de Saúde Pública*. Rio de Janeiro, 1948, May v. 1 No. 4 1059-1091. Charts. English summary.

Fifty-four patients suffering from malaria were treated with CAM AQI, 20 with chloroquine, 7 with paludrine and 15 with oxychloroquine. All four

drugs were effective in controlling the clinical symptoms of both *P vivax* and *P falciparum* malaria. In *P falciparum* infections, chloroquine and paludrine failed to free the peripheral blood of parasites in a very large majority of the cases treated with them. CAM-AQI was considered to be the most effective drug of the four: it caused more rapid disappearance of fever and parasites in *P vivax* infections than did the other three drugs; it is effective against both *P falciparum* and *P vivax* infections, a single dose is sufficient to rid the blood of parasites in both types of infection, there are no contraindications to its use.

Norman White

HALL, D Muriel & TURNER, E E. Structure and Antimalarial Activity Part III Some Benzimidazoles *J Chem Soc* 1948, Nov, 1909-11

HUMPHLETT W J, WEISS M J & HAUSER, C R. Preparation of Ketones from γ -Diethylaminobutyronitrile and Aromatic Grignard Reagents and their Conversion to Diamines Synthesis of Quinacrine Analogs *J Amer Chem Soc* 1948, Dec, v 70, No 12, 4020-23

COVELL, G, NICOL, W D, SHUTE, P G & MARYON, M. Studies on a West African Strain of *Plasmodium falciparum* The Efficacy of Paludrine (Proguanil) as a Prophylactic Agent *Trans Roy Soc Trop Med & Hyg* 1949, Jan, v 42, No 4, 341-6

Attempts have been made at Horton at various times, without success, to infect indigenous forms of *A maculipennis* var *atroparvus* with strains of *P falciparum* from India, E and W Africa, but success was achieved with strains of the same parasite from Sardinia and the Roman Campagna. Recently large numbers of the same species of mosquito were transported to W Africa by air and allowed to feed on children with gametocytes of *P falciparum* in their blood, but could not be infected. Defibrinated blood from a naturally infected child in Lagos was brought back on this trip and maintained in patients by blood inoculation. *A stephensi*, obtained from India, a common malaria carrier there and in the Persian Gulf, was found to be an efficient vector of the Lagos strain of *P falciparum* and was used in the prophylactic experiments described in this investigation.

Four groups of 5 neuro-syphilitic patients infected 9 or more years previously were used in the paludrine tests. Each was infected once weekly for 6 weeks by mosquito-bite or by intravenous injection of sporozoites. Treatment with the drug was begun 3 days prior to infection and was continued for 6 days after the last infection. One group received 100 mgm of the drug daily and a second group half this amount. A third group was given 100 mgm twice weekly and a fourth 300 mgm once weekly. None developed overt malaria during the whole course of the experiment and 18 of them inoculated later with sporozoites of the same strain proved to be susceptible. Three members of the staff were frequently bitten by infected mosquitoes during the experiment while taking 200 mgm of paludrine twice a week and did not experience malarial attacks. Two others while in Nigeria were inoculated intravenously with a salivary gland suspension of a heavily infected mosquito, presumably carrying *P falciparum*. They had taken paludrine daily in 100 mgm doses for some days up to and including that prior to the inoculation and did not become infected. One patient infected like those in the other groups was treated at the same time with 5 grains of quinine hydrochloride daily and another with double this amount. In both cases malarial attacks were suppressed during treatment but both suffered attacks within 2 weeks after it

ended. A group of 5 similar patient infected in the same way served as control and received no drug treatment. All had overt malaria within 14 days. The following is the authors' final observation —

Although paludrine acted as a true causal prophylactic of the *L. m. str.* of *P. falciparum* in each of the regimes under trial, it is considered that for immune person residing in or visiting West Africa should be advised to take not less than mg. 100 of the drug daily for the prophylaxis of malaria. For semi-immune subjects such as native labour forces and locally recruited Government employees, a weekly dose of paludrine mg. 300 is recommended.

J. D. F.

D'AMARA, G. B. Tecnica della profilassi antimalarica in Italia. [Anti-Anopheles Control Measures in Italy] *Riv. di Malariologia* 1945 27 v. 27 No. 2, 71-82. English summary (9 lines)

The author passes in review the antimalaria measures that have contributed to the effective control of the disease in Italy in the past. These have outgrown their usefulness. The use of DDT has engendered rather too much optimism as regards the ultimate complete eradication of malaria, by itself alone. DDT is of the greatest value in attacking epidemic malaria, but in dealing with endemic conditions a tightening up of older methods of control with a reorganization of the malaria control service will still be indispensable.

Veronica Wilder

SHOENJA, A. T. Species-Eradication. The Eradication of *Anopheles gambiae* from Upper Egypt 1942-1943. *Bull. World Health Organization* 1945 v. 1 No. 2, 309-52. 28 figs. (16 on 4 pls. 3 maps)

Anopheles gambiae entered Egypt from the Sudan at some time before March 1941 having probably been conveyed there in boats on the Nile. In that year dramatic outbreaks of malaria occurred first near the Sudan frontier then at Assuan, and later as far north as Assut. Enquiry showed that these were associated with a prevalence of *A. gambiae* which had not previously been reported in the country. Breeding places were numerous, particularly in the areas of perennial irrigation though its extent was largely controlled by low temperatures in the winter. In the hot season low humidity probably shortened the average duration of life of the mosquito sufficiently to prevent winter transmission for a large part of the year the epidemics occurring during the limited season when breeding conditions temperature and humidity were favourable.

With the help of the International Health Division of the Rockefeller Foundation a Gambiae Eradication Service was set up on the lines of the equivalent organization which had eradicated the same anopheline from Brazil a few years previously. The system of eradication used was one of organization and not of any special entomological technique. The basis of the organization was the *basic zone* an area of land in which two men working together could treat all water surface with hand-distributed one-per-cent Paris green in dust once a week. The boundaries of these zones, 641 in number were very easily defined so that they were readily identifiable on the ground and on a map. The two men in charge of the basic zone had no other duty than the distribution of Paris green which they did on an organized schedule. It could be readily checked. In each zone were grouped unit men of rank in charge of a foreman, a stable number of these unit men posted with a foreman or engineers in charge and seven of these unit men drawn from the ranks which operated direct under the I. H. D. quarters with its stores and laboratory.

A clear channel for the delegation of responsibility and the transmission of reports was thus provided. Each authority above the basic zone had an inspecting staff the duties of which included checking the anti-larval work and search for adult anophelines, though in pursuance of the policy of "one man, one job" these were carried out by different people. The results of this double check passed through each of the superior organizations which automatically sent inspecting staff to check negative records. By this emphasis on the importance of negative records with supporting data on the amount of searching which had preceded them, a reliable picture could be maintained at the central office where the campaign was directed. Traffic through the boundaries of the eradication zone was disinfested, DDT, then difficult to get, was used on trains and pyrethrum on other vehicles. A therapeutic service was also instituted and in some cases houses were sprayed with pyrethrum to terminate local epidemic conditions.

Work was first started in February 1944. The last specimen of *A. gambiae* recorded was caught in February 1945, but work was continued till the following August and then stopped just before the time of year most favourable to the mosquito. In the following three months, 1,200 men were engaged in survey work examining 400,000 units of breeding area and 60,000 houses each week but no *A. gambiae* were found and eradication was considered complete. Other anophelines were not eradicated (this had not been attempted), and showed a normal seasonal rise.

The campaign is modestly contrasted with that in Brazil and the point is made that conditions in Egypt are less suited to this mosquito than those in Brazil on account of the lower winter temperatures which helped the control work by restricting breeding. In a brief study of past history, it is pointed out that previous epidemics of malaria in this part of Egypt, which have been attributed to an unrecognized prevalence of *A. gambiae*, are explicable on other and simpler grounds. Without attributing previous epidemics to this anopheline it would seem rational on the analogy of known happenings in Brazil to suggest that the actual primary invasion of Egypt took place some years before 1912 and that a "silent period" intervened between the invasion and the epidemics.

The work described in this paper is truly of major importance, being only the second example of anopheline eradication in the world. It should be consulted in the original by all interested in the formation of national policies of malaria control.

G Macdonald

THOMSON R C, Muirhead D D T and "Gammexane" as Residual Insecticides against *Anopheles gambiae* in African Houses. *Nature* 1949, Jan 15, 109-110.

In experiments conducted in West Africa the author had drawn attention to the important effect of DDT treated surfaces as a factor of such importance as to throw doubt on the value of house treatment with DDT as a control measure. (in the *Bulletin* of this *Bulletin* 1948 v 45, 405)

With the use of similar entomological methods the experiments have been repeated by Dr. C. S. M. Tan, in which the DDT in kerosene used in West Africa was replaced by DDT dispersible powder (1 lb. to 1 gallon of water). Large numbers of blood-sucking anophelines were found in the window-trap daily, the majority of them on the floor being only a fraction of those which were caught in the window trap. For at least two months after treatment no blood-sucking anophelines were found inside the hut, creating the impression that a high kill of mosquitoes had been obtained.

These experiments were repeated, substituting Gammaxane (equivalent powder P.530 [now replaced by P.520] for the DDT powder. In contrast to the experience with DDT not a single living anopheles was taken in the wire trap up to thirteen weeks after treatment: numbers of dead *A. gambiae* were collected daily from the floor: the latter lethal action continued for at least three months after treatment. There was no indication of that irritative by drives *A. gambiae* out of DDT treated houses: feeding took place inside Gammaxane-treated hut, but a high proportion of *A. gambiae* were killed before they could bite: especially in the first two or three weeks after treatment. The author emphasises that these experiments were carried out under the conditions for testing an insecticide and that every possible resting place was heavily treated. The Gammaxane powder was applied at the rate of 400 mg. per sq. ft. (34 mgm. gamma isomer per sq. ft.) in a mixture of 1 lb. of P.530 in 1 gallon of water.

[The inference from Dr. Thomson's careful work is that Gammaxane is effective in killing *A. gambiae* which enter dwellings for a blood feed, but DDT is not. The broader aspect of the effect of this method, as a measure of control, on malaria incidence remains to be proved: the prospects are promising.]

R. Ford Tait

GERBERT S. Notes on certain Aspects of the Action of DDT Residual Sprays and on the Partial Treatment of Dwellings as a means of Anti-Anopheline Protection. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov. & Dec. No 3 295-7

In houses in an area of 16 square miles in Mauritius, the author collected 12,036 anophelines mostly *Anopheles gambiae*. The houses were then sprayed with residual DDT but no dead mosquitoes were found in daily searches three or four months afterwards. The author's view is that the mosquitoes were aware of the DDT in the houses and did not enter them. He supports this assumption with a theory that micro waves are emitted from the DDT which the mosquitoes can detect by their antennae.

He then gives figures to show that mosquitoes were present in 46 huts in another settlement. The walls of four of these huts were partially sprayed with DDT and an untreated hut was regarded as a control. No mosquitoes were obtained in the four treated huts when they were searched 10-15 days after treatment, but some mosquitoes could still be collected from the control hut.

[Publication of the facts might perhaps be justified, though as present they are lacking in detail: the conclusions drawn from them are unwarranted.]

P. I. B. 4

ANDREWS J. M. & GILBERTSON W. E. Blueprint for Malaria Eradication in the United States. *J. National Malaria Soc.* 1948 Sept. 7 No 3 167-78

Under the original proposal of Dr. Louis Williams it is now decided to try to eradicate malaria from the United States. The procedure decided on is a combined attack on the parasite and on the mosquito and the necessary inter-State and central organisation has been set up for this purpose including arrangements for standardised training. In endemic areas DDT treatment is applied twice a year to houses and other shelters at a dosage of 200 mg. per sq. ft. (7 oz. per 1,000 sq. ft.). An effort is being made simultaneously to improve the diagnosis and notification of malaria cases and to ensure that

proper treatment with effective drugs, and in a few specially selected areas which were previously hyperendemic studies will be made of the intimate epidemiology of the disease and the conditions which may lead to its recrudescence

After one year of work the programme has been put into operation in 80 per cent of the 400 most malarious counties. Although the prospects are thought to be bright, permanent surveillance by specialized staff will be needed to detect recurrence

G Macdonald

LENERT, LOUIA G & LEGWEN, W A A Review of Current Georgia Malaria Control Operations *J National Malaria Soc* 1948, Sept, v 7, No 3, 187-97, 1 fig

Georgia has experienced all phases of malaria control operations from drug prophylaxis to major drainage but since 1945 has relied on DDT as a residual insecticide. Power sprayers and the normal hand-pumped type of machine have been abandoned in favour of modified knapsack sprayers filled with air from a compressed air tank. In the apparatus now standardized the operator carries on his back two cylinders, one holding compressed air which it discharges through a pressure regulator to the other holding emulsion. The air cylinder is refilled as necessary from an air tank carried on a vehicle. DDT is applied as an emulsion at a dosage which has varied from 100 to 147 mgm per sq ft (3.5 to 5.2 oz per 1,000 sq ft), twice in each season with an interval of 10 to 14 weeks between rounds. The heavier dosage is not found to give comparably increased efficiency justifying the increased costs, and the lower dose is now standardized.

Public co-operation, though on the whole satisfactory, has clearly not been as good as it might be and complaints are fairly numerous. Malaria, diarrhoea and enteric appear to have been reduced, the number of reported cases of malaria in the last three years being 461, 109 and 59. Tentative plans include a ten-dollar reward under certain specified conditions to proven cases of indigenous malaria.

G Macdonald

JOBBINS, D M Algunos problemas en el control de mosquitos en la carretera interamericana de Centro America [Some Mosquito Control Problems along the Inter-American Highway in Central America] *Bol Oficina Sanitaria Panamericana* 1948, Sept, v 27, No 9, 819-23. English version 823-6

Increasing motor traffic on the completed or nearly completed parts of the Inter-American Highway in Central America has emphasized the importance of the prevention of mosquito-borne diseases at halting places along the route. Many of the larger centres of population in malarious areas have adopted measures of control that afford a reasonable degree of protection. In the smaller towns of the rural lowlands however, the malaria hazards are considerable. A survey of all such places as are strategically located along the Highway in all countries between Panama and the United States, was commenced in 1943 by the Pan-American Sanitary Bureau. Malaria risks are largely confined to areas below 1,000 feet above 3,000 feet malaria and its vectors are found in very restricted areas in Central America. Isolated foci of malaria in the highlands increased in number during the period of highway construction. This was due to the return of infected labourers to their homes in the hills.

The most important vector is *A. albimanus*. *A. pseudopunctipennis* is probably a secondary vector at high altitudes. Climatic factors in Central America have great influence on mosquito prevalence. Torrential rains in the wet season overload drainage channels built to restrict mosquito breeding and create fresh breeding places. Temperature and humidity during the dry season greatly restrict mosquito breeding on the Pacific slopes. Some adult female species survive only long enough in the dry season to lay eggs. The majority of adult females do not survive long enough in the dry season to be infective.

The Pan American Sanitary Bureau supervised sanitary work in construction camps along the highway mostly in Costa Rica and Nicaragua, where malaria is an important obstacle to labour efficiency. In temporary camps perimeter drainage methods of control could not be justified. In Costa Rica drainage ditching and oil larvicides resulted in excellent control of malaria. Perimeter control was inaugurated in lowland areas in Costa Rica malaria was reduced for from 12 to 40 per cent of all time lost by American labour employed by contractors.

In Nicaragua where large new camps were constructed on the Rama Road to the Atlantic which branches eastward from the Highway near La Manzanilla and Lake Nicaragua, full reliance for malaria control was placed on DDT as larvicide and for the destruction of adult mosquitoes in harrack and other buildings. Control was effective. DDT was used with equal success in other camps in Honduras. Imported malaria cases and carriers were many and required treatment.

In Guatemala between the highland and coastal highway routes which are parallel to the Pacific shore there is a coffee growing area in which Simuliids or Black Flies breed abundantly in swiftly flowing streams. Simuliids were controlled with DDT emulsion concentrate introduced as near the source of the stream as possible was found to be a practical larvicide. Retreatment was necessary at intervals of 1 to 3 weeks. Though effective the practice had to be discontinued. The water in these streams is used as a source of power for drinking, for washing and processing coffee and finally for irrigation. The use of the larvicide raised problems of poisoning water supplies, poisoning human and beneficial insects which come to obtain water from the streams, and power plants in the very dry weather the introduction of toxic materials into the processing of coffee beans and possible damage to plants by insecticide water.

Norman H. Kirk

GALVÃO A. L. A. & DAMASCENO R. G. Tempo da ação residual do DDT contra o *Anopheles darlingi*. [Duration of Residual Action of DDT on *Anopheles darlingi*.] *Rev. Serviço Especial de Saúde Pública*, Rio de Janeiro 1948 July v. 2, No. 1 17-22, 1 chart.

The English summary appended to the paper is as follows:—

Studies were made in Belém, Pará, on the duration of the toxic effects of residual DDT on *Anopheles darlingi*. Wooden walls were sprayed with DDT in kerosene solution at 5% leaving a residue of 0.09 Gm. per square meter. It was found that toxic effects of the insecticide disappeared completely by the eighth month of application.

Any observations referring to mortality caused by DDT in mosquitoes maintained without feeding should be made from the 8th to the 14th hour after capture. In the 48th hour the percentage of deaths from natural causes is very high."

PAMPANA, E J Malaria Control by Residual Indoor Spraying with Dichloro-Diphenyl-Trichloroethane (DDT) Survey of Methods for testing Residual Toxicity and of Results *Bull World Health Organization* 1948, v 1, No 2, 253-96, 6 figs [60 refs]

This is an analysis of the methods which could be used to estimate residual toxicity of DDT and a review of the literature on each method suggested. The subjects covered are —

1 Laboratory tests Experimental exposure chamber, wall exposure chamber, recording of data

2 Controlled field tests Determination of the residual toxicity of a given surface, release test, count of resting mosquitoes, determination of the survival rate of exposed mosquitoes

3 Evaluation of reduction in malaria transmission Anopheline density, man-biting rate, sporozoite rate, malaria incidence

4 Available evidence of malaria control by DDT spraying

Details of the methods described are given in full, and include most of the apparatus previously described by SIMMONS and staff [this *Bulletin*, 1946, v 43, 104, 789]. Each of the methods has its appropriate place, outlet window traps should be used and estimations of the survival rate of escaping anophelines made more frequently than in the past.

An appendix deals with the cost of malaria control with DDT residual spray. Insecticide itself is a major part of the cost of any scheme. The price of DDT in the U S A is 0.26 U S dollars a pound [0.45 Kg/m]. Kerosene as a vehicle is always expensive, its cost sometimes amounting to more than that of DDT. The cost of emulsions varies from 42 per cent to 74 per cent of that of kerosene solutions, and suspensions are somewhat cheaper still. There is a useful table which sets out the costs of several campaigns in a manner sufficiently detailed for comparison. They vary from 0.045 to 1.66 U S dollars per head per year. There is also a valuable bibliography.

G Macdonald

HERING, E R & GRIFFIN, J F Two Methods for Application of DDT in the Field *U S Nav Med Bull* 1948, Sept-Oct, v 48, No 5, 797-802, 4 figs

This paper reports the use of an apparatus for the production of DDT smoke, and a power sprayer for the distribution of DDT solution as a larvicide, the latter being mounted on an amphibious vehicle, in military manoeuvres.

Some specific defects were noted, but the authors were left with little doubt that their use would constitute a material advance in operational military hygiene.

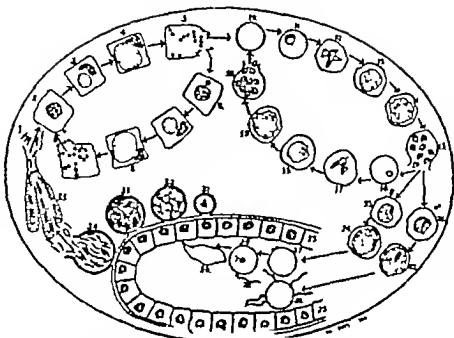
G Macdonald

RODHAIN, J Susceptibility of the Chimpanzee to *P. malariae* of Human Origin *Amer J Trop Med* 1948, Sept, v 28, No 5, 629-31

This paper is a summary in English of the author's work on *P. malariae* in the chimpanzee [this *Bulletin*, 1948, v 45, 978].

SHORTT, H E The Life Cycle of *Plasmodium cynomolgi* in its Insect and Mammalian Hosts *Trans Roy Soc Trop Med & Hyg* 1948, Nov, v 42, No 3, 227-30, 35 figs on pl

This paper describes the life cycle of the monkey parasite *P. cynomolgi* and includes a summary of the recent work on the exoerythrocytic stages [see this *Bulletin*, 1948, v 45, 388, 762, 872]. It is accompanied by a useful diagram, reproduced here, which shows the blood, liver and mosquito cycles.



- 1 Sporozoites from salivary gland of mosquito enter liver cells
- 2 Liver cell containing early stage of pre-erythrocytic parasite
- 3 and 4 Stages in development of the pre-erythrocytic schizont in liver cell
- 5 Fully developed pre-erythrocytic schizont rupturing and releasing pre-erythrocytic merozoites
- 6 Liver cell containing merozoites of exo-erythrocytic cycle of schizogony
- 7-9 Remaining stages in exo-erythrocytic schizogony ending in second generation of merozoites
- 10 Red blood cell of circulating blood
- 11-14 Stages in erythrocytic schizogony in circulating blood
- 15 Fully developed erythrocytic schizont rupturing and releasing erythrocytic merozoites and gametocytes
- 16-21 Repeat time of erythrocytic schizogony
- 22 and 23 Development of male gametocyte or microgametocyte in circulating blood
- 23 and 24 Development of female gametocyte or macrogametocyte in circulating blood
- 25 Wall of stomach of mosquito
- 26 Extragastrelling macrogametocyte producing macrogametes in stomach of mosquito
- 27 Macrogametocyte extruding polar bodies and so becoming macrogamete
- 28 Microgametes free in stomach of mosquito and seeking macrogamete
- 29 Zygote formed by fertilisation of macrogamete by single microgamete
- 30 Ookinete or travelling trichocoele formed by cleavage of zygote. It is about to penetrate epithelial lining of stomach
- 31 Oocyst, formed by ookinete after penetration of stomach wall of mosquito. It lies under elastic membrane on outer surface of stomach
- 32 and 33 Stages in development of oocyst with production of sporozoites
- 34 Rupture of mature oocyst with dispersion of sporozoites most of which enter salivary glands of mosquito
- 35 Salivary gland of mosquito containing mature sporozoites

[Reproduced from the Transactions of the Royal Society of Tropical Medicine and Hygiene]

P. C. C. Gurnham

GRAMICCIA, G. Ricerche sulla infezione degli embrioni di pollo con *Plasmodium gallinaceum* (II Nota) [Infection of Chick Embryos with *P. gallinaceum*] *Riv di Parassit* Rome 1948, Sept, v 9, No 3, 119-28 English summary (5 lines)

In a previous paper the author, in collaboration with G. RITA, described attempts to inoculate chick embryos with *P. gallinaceum*. Heavily infected blood was applied to the chorio-allantoic membrane and a small quantity was injected into the vitelline sac. Only two of 15 chickens acquired infection [this *Bulletin*, 1948, v 45, 158]. Further experiments are now reported. It was found that if the infected blood be drawn from a bird whose internal organs contain exo-erythrocytic forms of the parasite, infection of the embryo was invariably successful. Otherwise only occasional positive results were obtained. The technique adopted is described. *Norman White*

MOULDER, J. W. Effect of Quinine Treatment of the Host upon the Carbohydrate Metabolism of the Malarial Parasite *Plasmodium gallinaceum*. *J. Infect Dis.* 1948, Nov-Dec, v 83, No 3, 262-70, 2 figs [27 refs.]

Results by various investigators suggest that quinine exerts its antimalarial effects by a direct action on the parasites. The present investigation deals with the metabolic effects produced in *P. gallinaceum* by treatment of the infected host with the drug. For this study the activities of the parasites from an untreated host were compared with those from the same host 24 hours after treatment with a single dose of quinine intravenously equivalent to 20 mgm base per kilo. The chickens were inoculated intravenously with infected blood and the final suspension of thrice-washed parasites in Ca-free phosphate saline contained 1 to 2×10^9 parasitized erythrocytes per ml. Oxygen consumption and CO_2 production were measured in a manometric apparatus at 40°C . The small dose of quinine *in vivo* caused a marked change in the metabolism of parasitized cells which, although qualitatively similar, appeared to be greater than that caused by corresponding treatment *in vitro*. The changes noted were recorded in micromoles with respect to 10^{10} square μ of parasite surface area per hour, as used by SILVERMAN *et al* [this *Bulletin* 1945, v 42, 448].

It was found that quinine caused an increase in the rate of disappearance of glucose and of lactate formation, while the oxygen consumption of the parasites was reduced. The increase in O_2 consumption caused by the addition of glucose, lactate or pyruvate to the washed parasitized cells from an untreated chicken was not observed in those from quinine-treated birds. It was concluded that these differences in metabolism resulted from the direct action of quinine on the carbohydrate metabolism of *P. gallinaceum*, after the possible effects of an increase in reticulocytes in the blood and the presence of immune factors had been considered. Quinine did not alter the RQ [respiratory quotient] of parasitized erythrocytes metabolizing glucose, but when lactate and pyruvate were used as substrates after quinine treatment O_2 uptake and the utilization of these substrates was decreased, while the RQ and O_2 /substrate ratios were unaltered. The results of quinine treatment on the oxidation of the three substrates mentioned suggest that in the anaerobic phase their breakdown is not affected by the drug, while in the aerobic phase the complete oxidation of pyruvate via the tricarboxylic acid cycle is inhibited [cf SILVERMAN *et al* above]. Since KELSEY *et al* [this *Bulletin*, 1944, v 41, 11] have shown that quinine disappeared from the blood in a few hours, the present results indicate that the inhibition of carbohydrate metabolism by quinine is irreversible or that an effective metabolite of this substance continues to act.

J. D. Tullon

TRAGER, W. The Resistance of Egg-laying Ducks to Infection by the Malaria Parasite *Plasmodium lophurae*. *J Parasitology* 1949 Oct v 34 No 5 389-93 1 fig. [10 refs.]

It was noticed that a certain number of adult ducks infected with *P. lophurae* failed to respond in the usual manner to the disease: the parasites were low in number and abnormal in morphology. The meaning of this was indicated by repeating the experiments on 3 groups of ducks 6-7 months old. One group was composed of males, the second group of females with inactive ovaries, and the third group of females with active ovaries. They all received equivalent and very heavy doses of *P. lophurae*. Most of the ducks in the first two groups developed heavy infections, while the egg-laying group showed a poor response: the parasites not multiplying in nine out of 10 duck in this last group.

The author then proceeded to correlate this finding with the amount of biotin or biotin-actinoids in the plasma of the infected birds. A high biotin content was found to be associated with egg-laying activity and with a relative resistance to the malarial infection: male ducks had the lowest biotin concentrations and conversely were very susceptible to the disease.

P. C. C. Gernham

THOMPSON, P. E., with the technical assistance of Anita RAYNES, D. L. BROWN & Betty L. LILLIGRAN. On the Ability of *Plasmodium lophurae* to acquire Resistance to Chloroquine, Camoquin and Chloroquine. *J Infect Dis* 1948 Nov-Dec. v 63 No 3 240-55 [15 ref.]

The development of acquired resistance to paludrine (chloroquine) in *P. gallinaceum* was recently described (this Bulletin 1947 v 44 p. 870 1948, v 45 158). A similar resistance has now been shown to occur in the case of *P. lophurae* but could not be obtained with Camoquin (SN 10751) or with chloroquine both 4-aminoquinoline derivatives. White Leghorn chick 4 to 8 days old were inoculated intravenously with parasitized blood and the drug was administered in the diet for some hours previous to infection. They were maintained on a light and dark schedule for alternate periods of 4 hours in order that the intake of drug should be as constant as possible. The level of drug was such as to cause a 90 per cent. suppression of the infection. Under these conditions the parasites were kept in almost continuous contact with it. Subinoculations were made twice weekly over a period of 211 days and included 60 passages. When testing for acquired resistance suppression of infection to the extent of 50 per cent. or near the peak of parasitaemia was accepted as indicating that a drug was still effective. Within 28 days in which 8 passages were made resistance became evident in the paludrine-treated bird and was correlated with the morphological appearance of the parasites. The resistance developed only gradually in contrast to that obtained with *P. gallinaceum*. The resistance to paludrine did not affect the result of treatment with plasmoquine (amaquin), quinine, telmepoquine, chloroquine or Camoquin. Experiments on the persistence of resistance after mosquito transmission were not made.

J. D. Fulton

BARNGR, P. & FILSH, M. K. Contribution à l'étude des mélanges d'alcaloïdes du quinquina. A Study of Mixtures of Cinchona Alkaloids. *Ann Parasit* 1948 Oct v 75 No 4 329-37

In a previous paper (this Bulletin 1944 v 41 p. 103) the senior author with THOMAS reported from tests carried out on canaries infected with *P. relictum* that total alkaloid from different cinchona barks gave better therapeutic results than quinine alone. The result was poor however when the quinine

was removed. They have now found that certain combinations of the four main alkaloids in pairs give more favourable results in blood-induced infections of *P. relictum* and *P. gallinaceum* than quinine alone. It is possible that a synergistic effect results from the action of the alkaloids in combination on different stages in the life cycle of the parasites. Cinchonine seems to have a special mode of action, since its effects are produced at very much lower plasma concentrations than in the case of the three other alkaloids. In the case of *P. relictum*, the activity of each alkaloid was similar. There appeared to be a synergistic action between cinchonidine and quinine. Under the experimental conditions the results confirmed the previous findings that the activity of the total alkaloids from different barks is equal or superior to quinine or the other pure alkaloids. The percentage of quinine in the total extract did not appear to determine the activity of the mixtures. Similar experiments with mosquito-transmitted infections appear desirable.

J. D. Fullon

ASFANJO, C. F., FRIEIRE DE GUZMÁN, A. R., MAYORAL DE ASFANJO, A. G. & DE TOHIZ CANDAL, J. G. A Chemical Study of the Molinillo Plant (*Leonotis nepetifolia* L.), with special reference to its Seed. *Puerto Rico J. Pub. Health & Trop. Med.* 1948, Sept., v. 24, No. 1, 44-56, 2 figs. [Refs. in footnotes.] [Spanish version 57-68.]

Chick and canary tests gave negative results for antimalarial activity with the exception of the seed that showed a slight activity."

PARAENSE, W. I. Observações preliminares sobre o ciclo exoeritrocitário do *Plasmodium juxtanucleare* Versiani e Gomes, 1941. [Preliminary Observations on the Exoerythrocytic Schizogony of *Plasmodium juxtanucleare* Versiani and Gomes, 1941.] *Vem. Inst. Oswaldo Cruz*, 1947, Dec., v. 45, No. 1, 813-23, 1 graph & 15 coloured figs. on pl. English summary.

BARRITO (this Bulletin 1944, v. 41, 732) described briefly exoerythrocytic schizonts of this malarial parasite of the domestic fowl. He observed the forms solely in the cerebral capillaries 44 to 52 days after inoculation, and the schizonts he figured were small bodies with a maximum of 19 blocks of chromatin. Other observers in South and Central America have hitherto failed to confirm this work, but now Paraense has been successful in obtaining exoerythrocytic forms of a different type from those described by Barreto. He recovered the strain from a fowl bought in the Minas Gerais State of Brazil and maintained it in Light Sussex Rhode Island and Leghorn chicks. The infection was passaged intravenously and the birds were sacrificed at different intervals after inoculation. Smears were made of the spleen, bone marrow, liver, lungs and brain, and exoerythrocytic schizonts were found in these organs in numbers following the above order, being most numerous in the spleen (up to 5 parasites per field under the 1720 μ objective) and fewest in the brain. The schizonts were first seen 9 days after inoculation and were most plentiful during the third week. If quinine (150 mgm. per kilo druck) is administered after the fifth day of the patent period, parasitaemia is depressed to 4 per cent. or less, but the chicks die from the exoerythrocytic infection.

The author does not describe in the text the morphology of these parasites, but illustrates them by a coloured plate. In this plate may be seen rather small, oval, oval, or rectangular or endolothal cells in contrast with apparently a many-sided meronts. Mosquito transmission of *P. juxtanucleare* has still to be effected by the erythrocytes of the parasite, etc. etc. (see report described).

P. C. C. G. B. C. G.

SERGEANT Ed. & SERGEANT Et. *Haemoproctus wexron* nov. sp. parasite du moineau algérien retrouvé chez des canaris élevés en cage [*Haemoproctus wexroni* sp. nov. Parasite of the Algerian Sparrow recovered in Cage-Reared Canaries.] *Arch Inst Pasteur d'Algérie* 1948 Dec., v 78 No 4 394-6 2 figs.

A *Haemoproctus* was first found in parrots by GRASSI and FERRITI in 1880 in Sicily. It was redescribed by the present authors in 1907 from Algeria, while WEXRON in 1911 discovered the asexual forms in the sparrows of Bagdad. The species has remained nameless until now when it receives the name of *H. wexron*. It differs from most other forms by a marked irregularity of outline. The younger gametocytes are small oval bodies.

Large numbers of canaries are kept in cages in Algiers. In the neighbouring trees are thousands of sparrows. It is not surprising therefore that the arthropod-borne parasites of the latter eventually infect the caged birds. The sparrows are heavily infected with *Haemoproctus* as are 5 per cent. of the canaries. 100 per cent. of sparrows and 4 per cent. of the canaries show *Plasmodium relictum*. 13 per cent. of the sparrows and 0.04 per cent. of the canaries show *Eusporis sergenti*. The indigenous sparrow thus constitutes a reservoir of the local parasites and this situation is paralleled in human beings, the non-immune immigrant becoming infected with malaria and other endemic diseases.

[This paper is doubly *memorandum* since it was written two of the chief characters have died, Dr Etienne SERGEANT in August 1948 and Dr C. M. WEXRON in October.] P. C. C. Garnham

BLACKWATER FEVER

POURSIENE Y. & MOUTARDIER G. Contribution pathologique sur le mécanisme de l'anémie dans la fièvre bilieuse hémoglobinurique. A propos des lésions histologiques du rein. Application thérapeutique. Pathological Processes Involved in producing Anuria in Blackwater Fever: Histology of Kidney Lesions: Therapeutic Applications. *Méd. Trop.* 1948 July-Aug.-Sept.-Oct. 8, N 4 431-7 4 figs. 11 ref.

This account of the pathological processes involved in the production of anuria in blackwater fever does not differ substantially from that given elsewhere by the same authors (see this *Bulletin* 1949 49 170). Reference to treatment of anuria by intravenous novocaine is of a general sort and not directly concerned with blackwater fever. D. G. M. exp. 14

TRYPANOSOMIASIS

GUY EX. R. Note sur l'épidémiologie des trypanosomiasis buccales en relation d'élevage indigène au Kivu. [A Note on the Zoonotic trypanosomiasis in an African Stock Breeding Centre in Kivu.] *Bull. Soc. Méd. Trop.* 1948 Sept. 31, 28, N 3 245-54 4 figs; 2.

HILL S. C. Abnormal Effects of Zinc-Injection upon *Trypanosoma brucei*. *Proc. Soc. Exper. Biol. & Med.* 1949 Dec. 40, N 3 555 2 figs.

LIGHT GRANT A. Assay of the Toxic Action of Neoripidostol by Time-Mortality Data. *J. Pharm. & Pharmacol.* 1949 Feb. 1, N 2 76-86 2 figs. [In refs.]

NEGRINE, A. & ROMÁN, J. Present State of Chagas' Disease Surveys In Chile
Amer J Trop Med 1948, Nov, v 28, No 6, 835-9

This is a report of a survey carried out between August 1944 and December 1947 in the Provinces of Tarapaca, Atacama, Coquimbo, Aconcagua, Valparaíso and Santiago. 12,581 persons were examined by xenodiagnosis and in many cases blood was taken for serological tests. From examination of random samples in the endemic zones an average of 12 per cent was found infected with *T. cruzi*. During the period of investigation 1,631 human infections have been found. The distribution by Provinces is given in a Table, the chief were Santiago (734) and Coquimbo (441). Machado Guerreiro reactions were performed in 8,142 individuals from endemic zones and 17 per cent proved positive and another 10.9 per cent were suspicious (2-plus). [Some authors dispute the specificity of this test, so the authors themselves tried it on 2,000 sera from University students with no suspicion of any epidemiological antecedents of Chagas's disease, only two were positive]. Of 3,182 domestic animals, dogs and cats, tested by xenodiagnosis, 126 or 13.4 per cent, were positive, no rabbit or guinea pig was positive out of 126 examined and only 11 out of 698 "wild animals" and 8 of these were the indigenous Chilean rodent, *Octodon degus* Molina.

They have also examined 20,614 tritomidæ from different endemic zones, the percentage of infection varied, naturally from zone to zone, but, of the whole 9,164 (44 per cent) were infected—sufficient to explain the widespread infection throughout the country. For prophylaxis, the main object is of course, to build vinchuca proof houses, but in the meantime insecticides play a major part and DDT has been largely used. 5 per cent in kerosene, or of this strength prepared from a basic solution in xylol added to Triton X-100 as a detergent. 830 houses have been sprayed with 1.047 gm per house. Flies, fleas and bed bugs have practically disappeared. The results as regards Tritomidæ were not so good unless the infestation was very slight but they were reduced below the initial levels. With Gammaxene the results were practically the same as those with DDT. Chlordane (or Oltachlor) $C_{10}H_6Cl_6$, even in a 5 per cent concentration had little noticeable action on tritomidæ.

H. Harold Scott

The results of inoculating the Ber strain in man were surprising. As recently isolated strains of *L. tropica* are fatal to Syrian hamsters but produce only harmless local lesions in man. It seemed likely that the Ber strain, which was non-infective to hamsters would be similarly harmless to man. It was found, on the contrary, that when it was inoculated intradermally in two human volunteers, both developed lesions containing numerous LD bodies. Both cases also gave a positive leishmanin reaction. Cultures from these cases were non-infective to hamsters.

In one case originally infected in 1925 with flagellates obtained from a wild caught sandfly, a lesion developed which was cured spontaneously in about two years. This case proved immune to frequent subsequent attempts at re-infection and the skin test remained constantly positive between 1927 and 1938. In 1946 a phenolized suspension of the Ber strain was inoculated intradermally and produced an erythematous area of 4 in. in diameter at 48 hours which began to recede after 72 hours.

Five days after this inoculation living flagellates of a strain known to be infective to man and hamster were inoculated. This inoculation produced an erythema of 4 in. diameter with a central necrotic area. There was a temperature reaction. After 24 hours, a culture from the necrotic area yielded growth, results for leishmanin and was bacteriologically sterile. Later cultures remained sterile both as regards leishmanin and bacteria. The affected area developed lymphangitis and blisters, the former persisting for a week. The necrotic area became haemorrhagic and eventually healed leaving a scar. The sequence of events would appear to justify the conclusion that it was an example of an Arthus reaction produced by a protozoon.

The Ber strain showed a reduced infectivity for *Phlebotomus papatasi* as compared with recently isolated strains. H. E. Shortt

AUERBACH S. H. & BUCKHOLD, R. R. Cutaneous Leishmaniasis in the United States. Report of a Case in a Veteran. *Am J Trop Med* 1948 Nov v 28 No 6, 831-4 3 figs.

The thirty first case of cutaneous leishmaniasis reported from the United States and Canada is presented. All were exogenous. The patient was returned veteran who had been exposed to infection in the Mediterranean area. The disease responded satisfactorily to radiation therapy.

RITTERSON, L. L. & STACHLER, L. L. Protein Intake and Leishmaniasis in the Hamster. *Proc Soc Exper Biol & Med* 1949 Jan. v 51 147-50 2 figs.

Protein intake influences the course of leishmaniasis in the hamster. deficient diet is due to earlier emaciation and death. Excess dietary protein seems to favour survival.

FEVERS OF THE TYPHUS GROUP

RICCIARDI, C. & COZZIGLIOSI, E. L'opera dei Medici Italiani. La lotta contro il dermatite in Etiopia (1937-1947). The Work of Italian Medical Men in the Campaign against Typhus Fever in Ethiopia. *Ann Med* 1948 Nov v 3 No 11 293-303 4 figs.

An editorial preface to this long article is followed by a description of the work of the Italian medical staff in Ethiopia. The work is described in a clear and organized fashion. The Italian medical staff

This effort is described as all the more noble, and even heroic, because it was carried out in conditions of disturbance associated with a lost war and of discouragement due to uncertain future prospects

In such circumstances it is certainly surprising to find that about 90 articles on the typhus fevers of Ethiopia have been published or prepared for publication during the period. Nearly all of these have been written by the authors and Dr G MARIANI

Many references to the work will be found in this *Bulletin*

Louse-borne typhus was by far the most common form of the disease, but the occurrence of "benign flea typhus" has been definitely established, and it is said that both tick typhus and mite typhus have been clearly identified on clinical grounds, supported by serological and laboratory studies, which though not yet complete, are regarded as justifying the authors in concluding that the diseases occur in Ethiopia

John W D Megaw

MONTESTRUC E Contribution à l'étude des rickettsioses à la Martinique (Comportement des sérums des sujets normaux, des fébricitants et des femmes enceintes vis-à-vis des *Proctus* OΛ19, OΛ2, OXK, OAL et des rickettsies des typhus épidémique et murin) [A Study of the Rickettsial Diseases of Martinique (Well-Felix and Rickettsia-Agglutination Reactions among Normal Persons, Febrile Patients, and Pregnant Women)] *Arch Inst Pasteur de la Martinique* 1949, Jan, v 2, No 1, 3-20

CIACCIO, G Essais d'inoculation de *Rickettsia prowazeki* et *Rickettsia mooseri* chez les insectes Étude des anticorps spécifiques [Experiments in Inoculation of Insects with *Rickettsia prowazeki* and *R mooseri* Study of Antibodies] *Ann Inst Pasteur* 1948, Dec, v 75, No 6, 585-6

The following is a translation of the author's summary —

Pathogenic rickettsiae (*R prowazeki* and *R mooseri*) can be adapted to insects other than those which are ordinarily their hosts. The chrysalis of *Bombyx mori* and the larva of *Tenebrio molitor* support the survival of the virus, but nevertheless do not develop anti-rickettsial agglutinins [see also this *Bulletin*, 1947, v 44, 703]

H J O'D Burke-Gaffney

GALLARDO, F P & FOX, J P Infection of Guinea Pigs with Massive Doses of Rickettsiae of Epidemic and Murine Typhus *J Immunology* 1948, Dec, v 60, No 4, 455-63 [12 refs]

The authors have studied the effects produced by the inoculation of massive doses of epidemic and murine rickettsiae into guinea-pigs by the intraabdominal and intracardiac routes. Highly concentrated suspensions of infected yolk sacs and cotton-rat livers were employed, these caused severe, often fatal, disease, especially when administered by the intracardiac route.

The disease was more severe in large guinea-pigs than in small, and younger, ones, the authors suggest that this difference in susceptibility may be related to the greater severity of typhus fever in elderly patients.

Although the incubation period after massive doses was only two or three days the illness was a true infection, not an intoxication of the kind observed in mice inoculated with large doses of rickettsiae.

The authors believe that the employment of large doses is likely to be useful in the study of the chemotherapy of typhus fever and in the development of improved methods of carrying out serum-neutralization tests.

Among the four strains of epidemic rickettsiae employed was the "E" strain originally isolated in Madrid by CLAVERO and PÉREZ GALLARDO in 1943 [this *Bulletin*, 1944, v 41, 24], this was found to have maintained its low virulence—

through 239 passages in embryo chicks, it also produced a lower degree of immunity in guinea pigs than the virulent strains commonly used. (See this *Bulletin* 1919 v 48 n°4)

The infections caused in guinea pigs by massive doses were less severe in the hot season (June) than in the cold season (January and March)

John W. D. Meigs

LIU Wei-tung, CHANG, Hsueh-ching & WANG, Pei-jen. Further Observations on Complement Fixation in Typhus Fever. *J Infect Dis* 1949 Nov Dec v 83 No. 3 207-19. [22 refs.]

[See also this *Bulletin* 1949 v 48, 4.]

D'IGNAZIO C & MITCHELL P S. Rara complicanza oculare in un caso di dermatite. [A Rare Ocular Complication of Typhus.] *Acta Med Italica* 1918 Dec., v 3 No 12, 315-18. English summary (3 lines)

The English summary appended to the paper is as follows —

"The authors describe a case of optical neuritis in a patient suffering with typhus and point out some considerations about this rare complication.

MOORE, H. On the Nomenclature of the Agent of Murine Typhus. *Amer J Trop Med* 1918 Nov v 29 No. 6 841-3. [18 refs.]

The author raises strong objections to the proposal by PHILIP that the name *Rickettsia moorei* should be changed to *R. typhi* or *R. prowazeki* var *typhi* [see this *Bulletin* 1943 v 40 828]

The reason given for making this proposal is that WOLBACH and TOMP in 1930 gave the name *Dermacentor oxeus typhi* to the organism found in a form of Mexican typhus which Wolbach, in a personal communication to Philip, said he believed to have been probably of the murine type.

Moore insists that it would have been utterly impossible for Wolbach to have made a reliable diagnosis of murine typhus on the strength of the available evidence which consisted in the histological characters of sections of skin of few patients. Moore mentions a case in which expert (of the highest standing in 1931) made a confident diagnosis of epidemic typhus on the strength of a complete histological examination, but later had to admit that the disease was probably Rocky Mountain spotted fever. Reasons are given for believing that the cases seen by Wolbach were far more likely to have been of the epidemic rather than of the murine type so that the name given by Philip has no standing." [See the comment on the abstract above]

John W. D. Meigs

DIAZ RIVERA, R. S., GUZMAN ACOSTA, C., COLLAZO P. J. & DOMALUS LERON, A. Effect of Para Amino Benzoic Acid on Murine Typhus. A Clinical Study of 60 Cases. *Amer J Med Sci* 1949 Jan v 17 No 1 13-20 1 fig [18 refs.]

"During the past two years 33 patients suffering from murine typhus were treated by large doses of PABA and 27 patients picked at random were kept as untreated controls.

Treatment was started, on the average 8.3 days after the onset. The only effect on the rash was that it disappeared more rapidly in the treated. Two of the treated had severe nausea and vomiting but so also had some of the untreated controls.

Improvement in the general condition was usually evident within one or two days, the average duration of the fever was 8.7 days in the treated, and 15 days in the control, patients. There was no death in either group.

In 14 cases the treatment was started after the 7th day, yet in 6 of these the results were favourable.

The dosage was 4.0 gm initially, then 2.0 gm every two hours till convalescence was established. The total amount given was as much as 219 gm in some cases.

John W D Megaw

FITZPATRICK, Florence K. Effect of an Analogue of DDT on Experimental Murine Typhus. *Proc Soc Exper Biol & Med* 1949, Jan, v 70, No 1, 90-91.

"The nitro analogue of DDT when given in the diet for 7 days to mice infected with murine typhus resulted in a degree of survival on the 7th day equal to that obtained when 4 times the amount of PABA was administered. After the 7th day, when the drug was withdrawn, more PABA-treated mice succumbed, indicating that the nitro analogue is a better rickettsiacidal agent. The oral toxicity of the compound for mice appears to be of a low order."

RUIZ SANCHEZ, F & RUIZ SANCHEZ, A. El tratamiento del tifo exantemático con aureomicina. Reporte preliminar [Treatment of Typhus Fever by Aureomycin]. *Medicina Mexico* 1948, Dec 25, v 28, No 570, 521-7, 5 graphs.

Five cases of typhus fever, probably of the murine type, were treated by oral administration of aureomycin. The daily dose was 300 mgm per kgm of body weight given in divided doses every three hours. In the earlier cases the treatment was continued for several days, but later it was found that treatment for one or two days was equally effective. In every case the response to treatment was prompt and satisfactory.

The only signs of intoxication were occasional nausea, vomiting and diarrhoea, but these soon disappeared and did not necessitate interruption of the treatment.

John W D Megaw

SMADEN, J E. Chloromycetin in the Treatment of Typhus Fevers. *Bull U S Army Med Dept* 1949, Feb, v 9, No 2, 117-23, 3 figs.

This paper consists chiefly of a succinct summary of recent work on the treatment of fevers of the typhus group by chloromycetin. This work, most of which was done by the author, has been dealt with in recent numbers of this *Bulletin*.

Reference is made to a trial of the drug as a prophylactic: a group of 40 volunteers exposed to special risk of infection by scrub typhus in a hyperendemic area near Kuala Lumpur remained free from clinical symptoms during the period of exposure and for a week after ceasing to take the drug, but "thereafter, a considerable proportion" of them were attacked so that the drug seemed to have acted as a temporary suppressive.

Among 24 control persons exposed to the same risk there were 17 cases of the disease with onset between the 12th and 22nd day after initial exposure.

Further studies on the chemoprophylaxis of the disease are being initiated.

John W D Megaw

STOKER, M. G. P. Serological Evidence of Q Fever in Great Britain. *Lancet*, 1949 Jan 29 174-p. [14 refs.]

Among 24 sera from sporadic cases of atypical pneumonia, three were found to give positive complement-fixation reactions against an American and an Italian strain of Q fever antigen supplied by Dr. Herald Cox.

Two of the reacting patients had been living at a Royal Air Force Station near Salisbury. Wiltshire for some time before the onset, which was in April, 1949 in one case and February, 1948 in the other. There had been only one other case of atypical pneumonia at this station during the first half of 1948 but no sample of serum could be obtained.

The third patient was admitted to the Kingston County Hospital, near London in June 1949; this patient and one of the other two had never been abroad so that the infection must have occurred in England. The titres of the reactions were 1-40 to 1-80 and the result of the test were confirmed by Dr. Ross Gould at the Army Medical School, Washington in both of the sera submitted to him.

John H. D. Meyer

VISCHER, W. A. Gehäuftes Auftreten von Q-Fieber in einer Rekrutenschule [An Epidemic of Q Fever in a School for Recruits.] *Schweiz med. Woch.* 1949 Feb 19 v. 79 No. 7 137-R.

During the months of March and April, 1944 an explosive outbreak of Q fever occurred in a school for recruits at Monte Ceneri in Switzerland. There were 56 cases among 440 young recruits.

The source of infection could not be discovered; it was suspected that inhalation of infected dust was responsible because the outbreak occurred in fine and dry weather. Some cases were found to have occurred among the inhabitants of a neighbouring town which was visited by the recruit when off duty.

John H. D. Meyer

BECK, M. D., BELL, J. A., SHAW, E. W. & HUTCHINS, R. J. Q Fever Studies in Southern California. II. An Epidemiological Study of 300 Cases. *Pub. Health Rep. Wash.* 1949 Jan 14 v. 64 No. 41 561 map. [71 refs.]

This study formed part of a combined investigation by the National and California Health Services into the epidemiology of Q fever.

A detailed survey was made of the epidemiological conditions associated with 300 proved cases of the disease in the Los Angeles area.

The disease occurred throughout the area at all seasons and year after year. Most of the patients were adult males. Transmission of infection appeared to be associated with one of the following circumstances: (1) Employment in the dairy or livestock industry; (2) residence near a dairy or livestock yard; (3) the use of raw milk by the household.

One of these three factors could by itself have been responsible for the infection in more than half of the cases but in 78 per cent there was clear evidence that one or more of the factors could have been concerned and this percentage was greatly in excess of that applying to the rest of the population of the affected area. Further studies are in progress to discover the relative importance of each factor.

A useful bibliography supplies references to 28 papers on Q fever.

John H. D. Meyer

JELLISON, W L, HUEBNER, R J, BECK, M D, PARKER, R R & BELL, E J
Q Fever Studies in Southern California VIII Recovery of *Coxiella burnetii* from Butter made from Naturally Infected and Unpasteurized Milk *Pub Health Rep* Wash 1948, Dec 31, v 63, No 53, 1712-13

High-titre complement-fixation reactions against *Coxiella* [*Rickettsia*] *burnetii* were found to occur in guinea-pigs inoculated with refrigerated butter made from the raw milk of cows infected with Q fever. The butter was still infective after being kept in the refrigerator (below 0°C) for 41 days. A strain of the rickettsia from the butter was isolated and established in a guinea-pig.

John W D Megaw

JANTON, O H, BONDI, A, Jr & SIGEL, M M **Q Fever Report of a Case in Pennsylvania** *Ann Intern Med* 1949, Jan, v 30, No 1, 180-84, 1 fig [20 refs]

"The first report of a serologically authenticated case of naturally acquired Q fever in eastern United States is presented. The clinical features are discussed in detail with emphasis placed on the consideration of this disease in the differential diagnosis of respiratory disorders. The possible mode of transmission is discussed."

DE RODANICHE, E C & RODANICHE, A **Studies on Q Fever in Panama** *Amer J Hyg* 1949, Jan, v 49, No 1, 67-75 [24 refs]

Sera of 26 patients, including 17 diagnosed as suffering from atypical pneumonia, were tested by the complement-fixation reaction for Q fever. Only three gave a significant reaction, and from one of these a strain of *Rickettsia burnetii* was isolated.

In the Gorgas Memorial Hospital nine workers were engaged in the study of Q fever rickettsiae from March, 1947, but no case of obvious infection occurred till February, 1948, when one of them had a severe attack and a strain of *R. burnetii* was isolated from his blood. This worker was also engaged on field work in the course of which he was often bitten by ticks, so that infection may not have been acquired in the laboratory.

Four of the other workers were found to have positive fixation reactions at titres of 1-128, 1-64, 1-16, and 1-8, respectively, but none of them had suffered from any illness suggestive of Q fever. The worker with a titre of 1-128 was known to have had a negative reaction about four months previously so it appeared that he must have had a sub-clinical infection.

John W D Megaw

PHILIP, C B **Observations on Experimental Q Fever** *J Parasitology* 1948, Dec, v 34, No 6, 457-64

Most of the experimental work described in this paper was carried out before the recent war. Some of the chief findings are as follows.

Q fever infection could not be transmitted, even mechanically, by the bite of *Aedes aegypti* from infected to susceptible guinea-pigs. The mosquitoes were allowed to feed on the test guinea-pigs immediately after making the infected blood meal and also 10 to 30 days afterwards.

Infection rapidly disappeared from the bodies of the mosquitoes, as was shown by the failure to infect guinea-pigs with suspensions of the guts of the insects after an infecting feed.

Suspensions of infected *Dermacentor andersoni* were infective to guinea-pigs in dilutions as high as 1-500,000 millions, and in very high dilutions even after

passage through Berkefeld N and W candles. Dried faeces of infected *D. andersoni* were still infective after storage for 596 days, and after storage at room temperature, with 70 per cent. humidity, for nearly six years they still showed recognizable organisms and produced immunity in inoculated guinea-pigs though strains could not be isolated from the animal or by yolk-sac culture.

Infected faeces of ticks and suspensions of spleens of infected guinea-pigs caused infection in guinea-pigs by application to the unbroken skin. Powdered tick faeces dusted into the nostrils, eyes or mouth, of guinea-pigs caused infection. *D. andersoni* infected during the nymph stage and kept for 65 and 177 days at 35°F. were still highly infective. This result is in contrast with what happens in tick infected with *R. rickettsi* which need a "reactivating" blood meal before becoming infective in similar circumstances.

Infection was recovered from house-flies caught in a room in which infected guinea-pigs were kept, but house-flies did not appear to be capable of transmitting infection because when given free access at the same time to infected guinea-pigs in one set of cages and susceptible guinea-pigs in other cages no transmission occurred.

Flies fed on infected tick faeces and on infected spleen pulp of guinea-pigs became contaminated with the rickettsiae; this was shown by the production of the disease in guinea-pigs inoculated with suspensions of the bodies of the flies.

John H. D. Meyer

WOLFE D. M. & HORNFIELD Lottie. With technical assistance of LOIS GALLIX. *Conglutinating Complement Absorption Test compared with Hemolytic Complement-Fixation Reactions using Q Fever Immune Bovine Serum.* *Proc Soc Exper Biol & Med.* 1948, Nov. v. 69 No. 2, 251-5.

The essential difference between the Conglutination Complement Absorption Test and the ordinary complement-absorption test is that in the former clumping instead of haemolysis of red cells serves as an indicator of the presence of unabsorbed complement.

The occurrence of conglutination was first described by BORDET and STRENG in 1909 and a test for glanders based on this phenomenon has been worked out by HOLT and COCHRAN in 1947. The latter workers observed that clumping of sheep red cells occurs when a suspension of them is mixed with heat-inactivated bovine serum and fresh unheated serum of a horse, dog or cat. The bovine serum contains a natural antibody which sensitizes the sheep cells and also conglutinin; the fresh serum contains complement.

Technical details of the application of the test to the detection of Q fever in cattle are given in the paper.

From the tests already carried out the authors conclude that the reaction is likely to prove more sensitive and more specific than the complement absorption test in common use. Further studies are said to be in progress.

John H. D. Meyer

SHEPARD C. C. Q Fever: a Serological Survey of Bovine Serums in the United States. *Amer J Trop Med.* 1948 Nov. 28 No. 6 849-55 (11 refs.)

Through the organization which exist for testing cattle for brucellosis it was possible to obtain samples of serum from 1783 cattle from 37 States of the U.S.A. other than California.

Complement-fixation tests showed that 77 of the cattle were or had been infected with Q fever. Positive samples originated from the following States — Pennsylvania, Wisconsin, Minnesota, Missouri, North Dakota, Nebraska, Kansas, Virginia, Kentucky, Mississippi, Texas, Colorado, New Mexico, Arizona,

Washington, and Oregon. In Pennsylvania there was only one positive among 99 samples, in Nebraska, Missouri and Wisconsin there were three positives among 48 to 50 samples, in all the other States mentioned there were either one or two positives in 47 to 50 samples.

Only two of the positive samples came from the eastern one-third of the U S A.

A rickettsia-agglutination test was carried out on a large number of random samples of the sera with the surprising result that there were 68 per cent of positive reactions at titres of 1-5 to 1-125. These reactions were regarded as non-specific and as being due to the presence of "natural" antibodies.

In a footnote the author states that since this paper was submitted for publication the official name of Q fever rickettsia has been changed from *R. burneti* to *Coxiella burneti*.

[No mention is made of the official agency by which this change was decreed. The change was proposed by PHILIP in 1943 (see this *Bulletin*, 1943, v 40, 828). In the same article Philip proposed that the name *R. mooseri* should be changed to *R. typhi*, this proposal has been severely criticized by MOOSER (see below). Philip also advocated the use of the name *Dermacentroxenus rickettsi* instead of the more usual *R. rickettsi*.

It is to be hoped that definite evidence of the necessity for these changes will be provided, otherwise there may be passive resistance to their acceptance.]

John W D Megaw

OLIPHANT, J W, GORDON, D A, MEIS, A & PARKER, R R. Q Fever in Laundry Workers, presumably transmitted from Contaminated Clothing. *Amer J Hyg* 1949, Jan, v 49, No 1, 76-82, 3 figs [18 refs]

Recently three cases of Q fever and three cases of subclinical infection occurred among 13 persons employed in a laundry in which soiled overalls, towels, etc from the Rocky Mountain Laboratory, Montana, were laundered.

The six persons infected were the only ones engaged in handling the articles before laundering. No likely source of infection other than the soiled articles was discovered.

John W D Megaw

SPICKNALL C G, TERRY, L L & HUEBNER, R J. Treatment of Q Fever with Streptomycin. A Case Report. *Amer J Trop Med* 1948, Nov, v 28, No 6 845-7, 1 fig [13 refs]

There was apparent response to streptomycin.

YELLOW FEVER

HADDOW, A J, SMITHBURN, K C, DICK, G W A, KITCHEN, S F & LUMSDEN, W H R. Implication of the Mosquito *Aedes (Stegomyia) africanus* Theobald in the Forest Cycle of Yellow Fever in Uganda. *Ann Trop Med & Parasit* 1948, Sept, v 42, No 2, 218-23 [12 refs]

As the result of their previous studies of the epidemiology of yellow fever in Uganda, the authors concluded that the mosquito *Aedes africanus* Theobald is probably the main vector which transmits the infection among the arboreal monkeys. Yellow fever virus was isolated from a mixed lot of *Aedes* mosquitoes belonging to twelve species, including *A. africanus*, in 1944. Further large catches in 1944 and 1945 failed to yield virus. The method of investigation was then altered. Rhesus monkeys were placed on 16 platforms in different areas of the forest at the level of the canopy. The monkeys were tested for

neutralizing antibodies beforehand and at monthly intervals. Temperatures were taken daily. None of these animals contracted yellow fever. Further mosquito catches and 13 monkeys on platforms gave negative results in 1946. In 1947 it was found that 4 *A. f.* did not readily enter the type 1 monkey cage used, so that monkeys were then secured uncaged on 39 platforms. The monkeys all remained negative in 1947 in Bwamba where most of the platforms were, but one monkey stationed at Zika in the forest on the shore of Lake Victoria became infected and recovered. On the other hand mosquito catches were negative in Zika but the virus was isolated in December 1947 from a batch of 4 *A. africanus* from Bwamba.

F. O. MacCallum

HADDOW, A. J. & DICK, G. W. A. Catches of Biting Diptera in Uganda, with Anaesthetized Monkeys as Bait. *Ann. Trop. Med. & Parasit.* 1948 Dec. v. 4, No. 34 271-7

The authors continue their studies on mosquitoes in Uganda, giving particular attention to those species which live in forest canopy [this *Bulletin* 1949 v. 48 177]. They are much interested in *Aedes fuscans* which lives much in treetops and has been shown to contain virus.

They here describe experiments using monkeys (*Cerc. pileatus* of two separate species and Indian rhesus monkey) narcotized with nembutal. They only record mosquitoes which actually bit the monkey, which were exposed at various levels from the ground to the treetops. In each of three catches the most frequent biter was *Aedes africanus*. It forms a higher proportion of the catch on monkey than on man (the converse being true of *An. phlebotomus*). They record fifteen species of mosquito and one *Chrysops* biting monkeys.

P. I. Burton

DENGUE AND ALLIED FEVERS

KAWAMURA, R. FUKUTSUKI, S. ITOH, T. ITOH, H. TAKAGI, S. & OBATA, Y. Kulturelle Ergebnisse im bebrüteten Hühneret von Denguevirenter Rangoon Typ. Results obtained by the Culture of Dengue Virus (Rangoon Type) in Embryo Chick. *Wissenschaftl. Ztschr. Exper. Med.* 1947 June 79 No. 1 1-28 4 charts & 8 figs. on 3 pls. (2 coloured). 17 ref.

The authors have maintained a strain of dengue virus in embryo hick through 20 passages, and have transmitted infection to human being by inoculation with suspensions of the chorioallantoic membranes of infected embryo chicks of the 14th passage.

Modified attacks were also produced in Formosan apes by similar suspensions of membranes of the 15th passage.

The naked-eye and microscopic changes produced in the chorioallantoic membranes are described. In all essential these appear to correspond to those described by SKORRIT *et al.* who in 1936 were the first to employ embryo chicks for cultivating the virus.

Round and elliptical inclusion bodies found in the mesenchyma cell of the infected membrane are described and illustrated. Their nature is regarded as doubtful.

John W. D. Megaw

BARLOVATZ, A. Fièvre rouge congolaise et mononucléose [The Red Fever of the Congo and Mononucleosis] *Ann Soc Belge de Méd Trop* 1948, Sept 31, v 28, No 3, 315-43

The author gives a clinical description of an epidemic of a short fever which occurred during the first half of 1948 at Yangambi on the Congo River 100 kilometres down-stream from Stanleyville

There were 30 cases among the European population and it is stated that sometimes as many as 50 per cent of the Europeans in certain localities of the Belgian Congo are attacked by the disease

The disease is described as a fever with rapid onset, lasting a few days, and associated with a scarlatiniform, rarely morbilliform, rash. A variable degree of enlargement of the lymphatic glands occurs. Asthenia and rheumatic pains often persist for a long time after defervescence

At the onset leucocytosis was usual, but in three of the nine cases in which the results of repeated blood counts are given the total leucocyte count fell rapidly, in one case to 2,000, in another to 2,100, and in the third to 3,300 per cmm. In the later stages there was often a pronounced lymphocytosis or monocytosis. The Paul-Bunnell reaction (agglutination of sheep erythrocytes) was positive in some cases, and the author regarded the disease as being clinically related to the "infectious mononucleoses". He admits, however, that it is not easy to differentiate the disease from dengue, the only points mentioned being that the saddle-back temperature curve which occurs in typical dengue was hardly ever seen in the Yangambi epidemic, and that the rash appeared rather earlier than would be expected in dengue

[Apparently the name *fièvre rouge congolaise* has been applied to several kinds of short fever, and in most cases the term P U O (pyrexia of uncertain origin) would be more appropriate]

John W D Megaw

RABIES

WRIGHT J T & HABEL, K. A Comparison of Antigenicity and certain Biological Characteristics of 6 Substrains of Pasteur Fixed Rabies Virus. *J Immunology* 1948, Dec, v 60, No 4, 503-15, 2 figs [22 refs]

In a previous article [this *Bulletin*, 1948, v 45, 478] it was shown by the authors that different substrains of the original Pasteur fixed virus varied in their ability as challenge virus to produce rabies in mice equally immunized by any given vaccine, including a vaccine prepared from the homologous virus. This ability to break down a given amount of immunity—designated as the relative "invasiveness" of the viral substrains—appeared to be unrelated to the degree and breadth of the antigenicity of the substrain used as a vaccine and to its ability to produce rabies in non-immunized animals. [The substrains in question had been carried in different laboratories over a period of years by different workers using different intracerebral passage techniques]

If as the authors believed this ability to break down immunity by an intracerebral challenge was an essential characteristic of the viral substrain, then it should be capable of demonstration by immunological techniques, other than the intracerebral cross-immunity type of test

partial kills. Barium carbonate gave good but not complete kills at concentrations up to 50%, while strychnine sulfate killed few rats in the range tested.

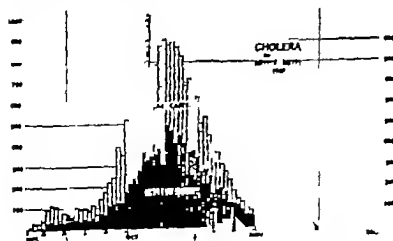
"The amounts of unpoisoned cornmeal consumed on 2 successive nights, by male and female wild Norway rat in various weight groups were determined. The addition of very poison except thallium sulfate to the cornmeal caused a considerable reduction in intake owing thereto recognition of the poison or to a rapid onset of toxic effects."

CHOLERA

SNOLSKA, A. T. Cholera Epidemic in Egypt (1947). A Preliminary Report. *Bull. World Health Organization* 1948, 1 No. 2 353-81 1 map & 1 chart.

This preliminary report on the cholera epidemic in Egypt in 1947 summarizes the main features of the outbreak and the measures undertaken for its control. Egypt which had been infected during five out of six of the great pandemics of the 19th century and had suffered severely had been free from the disease for 45 years when cases were detected in September 1947 at the village of El Korein in the Delta, without any warning having been given of an approaching risk, or any indication obtained from mortality statistics of a rise in incidence of epidemic disease. Immediately cholera was suspected El Korein was cordoned off to prevent entry and exit in the hope of limiting the spread of the disease but almost at once cases were detected at Mostorod in the Bahiyah Province and at other points in the area.

To cope with the risk of an epidemic special administrative and sanitary measures were immediately instituted, powers being taken by the promulgation of special decree-laws to restrict movements, to regulate supplies and to enforce sanitary and other precautions which might assist in limiting the spread of the disease. Control of traffic by rail road and river was introduced and movement from infected to uninfected area was prohibited except in the case



Daily cases and deaths in the Delta epidemic 1947
Reproduced from the Bulletin of the World Health Organization

of persons in possession of valid certificates of inoculation with cholera vaccine. Inoculation of the crews of river craft and ferries was undertaken from the beginning of the outbreak. In spite of these precautions, cholera spread to all provinces of Lower Egypt and, although rail traffic from Lower Egypt was entirely suspended for six days to allow of the inoculation of travellers, Upper Egypt also eventually became infected.

The details of spread, in chronological order, to different parts of the country, have been published in successive issues of the Weekly Epidemiological Record of the W H O [the subject has been fully reviewed in this *Bulletin*]. From the commencement of the outbreak on 22nd September to its termination at the end of November, 1947, with a few subsequent dropping cases, the total incidence recorded was 20,804 cases with 10,277 deaths giving a case mortality of about 50 per cent. The rise and fall of the epidemic is shown in the chart.

The weekly incidence by Provinces and Governorates is shown in a table (II), the highest number of cases being in the Provinces of Beheira, Gharbiya, Minufiya, Dakahlia, Sharqiya and Kalyubia in Lower Egypt. Incidence in the towns, Cairo, Alexandria, Port Said and Suez, was low.

A very brief summary is given of the measures taken. These include isolation of patients, inoculation of contacts at the beginning of the epidemic, followed by mass inoculation of the entire population, protection of water supplies and provision of temporary supplies, measures to prevent infection from food and drink, improvements in general sanitation, and an anti-fly campaign.

To carry out the various measures applied in control and in care of the sick, a special organization was built up, the scheme for which is summarized in Table VI of the report. Members of the senior staff of the central administration were appointed to supervise the operations in each area and to arrange for staff equipment and supplies. A very large staff was placed on cholera duty, the total eventually including 930 doctors, 479 sanitary inspectors and 820 nurses.

For the early detection of cases of cholera, "flying squads" were formed to search villages and to carry out disinfection, protection of water intakes and other immediate measures. When the epidemic abated, alert measures were instituted for the purpose of detecting any persisting infection. All cases of vomiting and diarrhoea were dealt with as cholera until a bacteriological examination gave a negative result. Enquiries on all deaths were made by a medical officer of health or a sanitary inspector and swabs taken from the rectum for cultures. Out of 13,739 swabs examined between 16th December, 1947, and 12th January, 1948, positive findings were made in 43. A continuous search for carriers was undertaken.

Short notes on some of the measures taken and on the observations made are given in the report.

Protection of water supplies—The dose of chlorine added to public water supplies was increased. Pipe lines were extended to suburbs of towns and cities and new sanitary pumps installed at villages which had not previously had pumped supplies. All Abyssinian wells (drawing water from a few feet below the surface) and open wells, were closed. Where the source of supply was from canals, sites were selected at which, only, water would be drawn and the raw water was disinfected by the addition of chlorine solution or bleaching powder.

Isolation and discharge of cases and contacts—At first the patients were isolated in the nearest infectious diseases hospital, but as their numbers increased practically all hospitals and health centres, with the exception of one in each province which was kept for emergencies, were temporarily converted for use as cholera hospitals. Additional accommodation was later provided in tents, huts, schools or other buildings. House contacts were isolated in any available buildings and when isolation was not possible surveillance was carried out.

the incubation period. The practice adopted in regard to discharge of convalescents was to carry out a bacteriological examination of the stools on the 5th day of convalescence and again three days later. If both specimens were negative the patient was discharged usually about the 19th to 24th day from the onset of the attack. If a positive result was reported three consecutive negative samples at intervals of three days, were required before discharge. In the case of contacts, if two samples taken on the 2nd and 4th days of isolation were negative discharge was permitted. If one sample was positive three consecutive negatives, as in the case of convalescents were necessary. A five-day course of sulphaguanidine was given to both convalescent and contacts while under observation and repeated if the vibrio could still be isolated.

Duration of the carrier state—Observations were made on the period of persistence of the vibrio in the stools of 463 convalescents in four hospitals. The findings are shown in Table V of the report. The minimum and maximum periods from the beginning of the attack at which the vibrio was isolated are stated to be respectively 7 and 4 days. (A considerable difference is shown in the table on the findings in the four hospitals. In Cairo and Alexandria respectively only 14 per cent. and 5.2 per cent. were positive after the 15th day while in Zagazig and Tanta the figures were 31 per cent. and 76.7 per cent. respectively.)

Positive cultures were obtained from 288 out of 13,702 contacts examined, giving a rate of 2.1 per cent. Of these 85 developed the disease i.e., 0.6 per cent. of total number of contacts. Table VIII of the report shows the duration of excretion of the vibrio by contacts. The majority were negative after 5 days and 83.6 per cent. were negative after 10 days. The maximum period observed was 19 days.

Observations made on the effect of sulphaguanidine and sulphacetamide on the persistence of the vibrio (Table VI) favour the use of the former drug.

The bacteriological work carried out during the epidemic involved the examination of 119,079 specimens.

*Survival of *V. cholerae**—Investigations were carried out on the periods of survival of *V. cholerae* on different foods and material contaminated in one set of experiments with faecal material and with cultures in another. The results are summarized in a table. The food-stuffs tested were onion, garlic, orange, lemon, grapes, dates, lentils, rice, sugar and bread. The other articles were coins, postage stamps, bank notes and cloth. The vibrio was not recovered later than the third day on any of the food-stuffs or materials when fresh stool material was used. Survival in acid fruit such as lemons and oranges was a matter of a few hours only. The findings are tabulated.

Inoculation—Inoculation of the whole population with cholera vaccine was undertaken. At the outset of the epidemic only a small stock required for the inoculation of pilgrims was in hand and it became necessary to supplement local manufacture by obtaining supplies urgently from other countries. Over 5 million ml were received as donations and 10 million ml on payment. Later the production at the Vaccine and Serum Institute in Cairo was stepped up from 40,000 ml daily to 400,000 ml to meet the requirements. The dose employed in the mass inoculation campaign was 1 ml containing 800 million vibrios. Staff working on cholera were given two doses, 0.5 ml followed by 1.0 ml one week later. A complete re-inoculation of the population was undertaken commencing on 15th February, 1949 as a precaution against recurrence of cholera.

In discussing the evidence on the value of inoculation the opinion is expressed that "While it is difficult to believe that inoculation alone accounted for the complete suppression of the epidemic there is no doubt that it was of great importance in modifying the general trend of the outbreak and in reducing

incidence and mortality. The findings suggest that the epidemic of cholera was finally ended by large-scale vaccination." A comparison is made between the incidence and the fatality rate in the 1947 epidemic as compared with that of 1902, when the population was only half that of the present time. The gross morbidity rate is estimated to have been four times less in the recent outbreak and the mortality rate seven times less than in 1902, when no vaccination was undertaken. The figures of eight different fever hospitals show that 18.7 per cent of the cases were in inoculated persons, 81.1 per cent in the uninoculated, the case mortalities in the two groups being 26.5 per cent and 42.9 per cent, respectively.

Anti-fly campaign.—In view of the possible risk of carriage of infection by flies a vigorous anti-fly campaign was undertaken in which the Insect Eradication Section and the Malaria Section of the Ministry of Public Health were employed. Aircraft were used for the purpose, "fogging" being carried out with a 20 per cent solution of DDT in Velsicol, and "spraying" with a 10 per cent solution in kerosene. A 7 per cent solution of DDT in Malariol was also used for ground fogging by discharge from the exhaust of a jeep. Hand-guns and mechanical pumps were used inside houses. A special evaluation of the results was undertaken by the staff of the Insect Eradication Section and a general decrease in fly population is claimed in treated villages as compared with controls. A separate report on the findings will be published.

Quarantine restrictions.—Under the heading "Cholera Hysteria," the author refers to the restrictive measures applied by certain countries against the risk of the introduction of cholera infection, which far exceeded the provisions of the International Sanitary Conventions. These included, in some cases, the complete closure of frontiers against passengers and goods, and even mail, from Egypt. One country prohibited the importation of food-stuffs, not only from Egypt, but also from eight countries "threatened" with cholera. "Other countries prohibited not only food-stuffs, but also Egyptian cotton, forgetting the fact that they had been importing for years jute from Bengal and rice from China and Indo-China, the main endemic and epidemic centres of cholera, without any evil consequence." "International control as provided for in the conventions, ought not to be set at naught and disregarded on the principle of each country for itself." Comment is made on the importance of developing a long-term policy of sanitary improvement in the known endemic areas of cholera, for the purpose of reducing the risk of spread or even eliminating infection altogether.

In concluding the report, acknowledgment is made of the generous help given to Egypt by States and private organizations during the epidemic and to the assistance rendered by the World Health Organization.

This preliminary report will form a useful background to more extended publication on the various aspects of cholera as seen in Egypt and on the observations made.

J Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SPINGARN, C. L. & EDELMAN, M. H. The Use of Streptomycin in the Cultivation of *Endameba histolytica* from Stools. *Amer J Trop Med* 1948, Nov, v 28, No 6, 825-9.

It is difficult to grow *Entamoeba histolytica* successfully from stools containing cysts alone. If streptomycin is added to the culture medium much better results can be obtained, even from stools a week old. Three drops of faecal suspension are added to the mixture of horse-serum and saline covering the

solid slope [this *Bulletin* 1948 v. 45:428]. Streptomycin in varying concentrations (1 to 10 mgm. per cc.) is also added: there is no optimum dose, because each strain behaves differently.

Control tubes without the antibiotic were set up and inoculated. Positive cultures were obtained in 8 per cent. of the controls and in 73 per cent. of the streptomycin tubes. The growth of *Blastocystis* and of bacteria was much inhibited in the latter. Trophozoites of the amoeba were usually abundant and subculture was easy. Excystation occurred within 48 hours at 37°C. but might be delayed for nine days.

The employment of a standardized technique would prove useful in the numerous cases where amoebiasis is suspected but the diagnosis is not completely established.

J. C. C. Garnham

CHU, C. H., T. C. W. H., CHU, H. T. & LI, C. H. *Endamoeba histolytica* and other intestinal protozoa in Szechwan. A Preliminary Report. *Chung Hwa Yeh J. Chemist* Edition 1945 Apr. v. 63, No. 3:134-8. [13 refs.]

THOMPSON, M. Le forme a tipo setticemiche dell'amebia L. (Amoebiasis with Septicaemic Type of Symptoms.) *Boll. S. Italiani di Tripolitania* 1943, July-Dec. v. 6 No. 3/4:17-21. [11 refs.] English summary (8 lines)

Many patients with *E. histolytica* appear to enjoy perfect health: others may show symptoms who have never suffered from dysentery but become alarmingly ill with symptoms pointing to involvement of other organ: for example liver, lungs, brain. Some cases resemble typhoid, or malaria, or undulant fever or appendicitis. In others there may be no localizing symptoms but fever remittent or intermittent with sweats, shiverings, slight enlargement of the spleen. Widal negative, leucocytes not increased (8,000-8,100 per cmm).

Three such cases are detailed. For a time they were very puzzling but examination revealed that the patients were passing *E. histolytica* or its cysts or both. Treatment with emetine was started. Improvement was seen in one patient a lad of 17 years after the first injection: the other lost their fever in 4 days and progressed uninterruptedly to recovery. The author postulates that the amoebae may settle in some focus without producing symptoms, or that there may be temporarily at least, immunity to their presence in the intestine: that this breaks down and a septicæmic condition—an amoebiæmia—be set up.

H. Harold Scott

COXON, R. V. Some Observations on Amoebic Dysentery. *J. Roy. Army Med. Corps.* 1948 Dec. 91 No. 6:243-50. 17 refs.

The material for this paper was collected in India during 1943 and 1944. All cases were considered primary and all in the control series had lesions demonstrable sigmoidoscopically.

Emetine (0.065 gm.) was administered by deep subcutaneous injection: emetine-bismuth-iodide was given orally—a powder derived from crushing a tablet preparation, the daily dose (0.2 gm.) being taken in the evening. In the majority of cases the first dose induced marked degree of nausea which was taken to imply that it was being satisfactorily absorbed. For quinine retention enemata 250 ml. of a 2.5 per cent. (w/v) solution in water were used. The enema was preceded by a wash-out with 2.0 per cent. aqueous sodium bicarbonate solution with the patient lying on the left side and afterward adopting the knee-elbow position. A series of 9 cases receiving no special treatment as retention enemata of saline were retained as control.

Amibiarsen (Martindale, 1941) was given by mouth in form of tablets, the dose being 0.25 gm morning and evening. Oral quinoxyl was in aqueous solution, two doses, each containing 0.25 gm, were given daily.

Test of Cure—Specimens of 6 stools passed at intervals of not less than twenty-four hours were examined for trophozoites and cysts of *E. histolytica*. Sigmoidoscopy being negative the patient was transferred to the Convalescent Depot for 3 weeks where he lived on normal Army rations. At the conclusion three further specimens of faeces were examined and another sigmoidoscopy was made.

A case was recorded as a "success" if, at the conclusion of this period, no evidence of recurrence had been obtained.

The schedules of treatment are shown in a table and are divided into 5 groups.

1 Emetine, 0.065 gm daily, 1st to 6th day, EBI, 0.2 gm daily, 7th to 12th day and 20th to 25th day, quinoxyl rectally, 5th to 14th days, amibiarsen, 0.25 gm twice daily, 13th to 25th day.

2 EBI 0.2 gm daily and quinoxyl rectally, 1st to 10th day, quinoxyl 0.25 gm twice daily, for one month.

3 Emetine 0.065 gm daily, 1st to 6th day and 10th to 15th day, amibiarsen, 0.25 gm twice daily, 7th to 16th day.

4 EBI 0.2 gm daily, 1st to 11th day.

5 (Control) Distilled water, 1 ml, 1st to 6th day, sodium bicarbonate 0.5 gm, 7th to 12th day and 20th to 24th day, rectal saline, 5th to 14th day, glucose, 1 gm twice daily, 13th to 25th day.

The successes for each of the first four groups are shown respectively as 91.7, 72.7, 92.3 and 80 per cent (average, 84.8) for the control group, the successes are shown as 22.3 per cent.

Concomitant bacillary infection was discovered in nine cases and sulpha-guanidine was considered to be indicated only when frequency of defaecation was exhausting or there was severe tenesmus. On several occasions amoebae were seen moving among cells of a typical "bacillary exudate".

In the control series of 6 cases receiving no specific treatment, the ulcers which had been visualized through the sigmoidoscope disappeared within periods varying from ten to twenty-four days.

It is concluded that reasonably satisfactory results could be achieved by either oral EBI or parenteral emetine combined with an organic arsenical, but no appreciable improvement resulted from the addition of quinoxyl retention enemata while sigmoidoscopic observation of control cases showed healing of amoebic ulcers in absence of specific medication. *P. Manson-Bahr*

GIMBLE, A. I., DAVISON, C. & SMITH, P. K. *Studies on the Toxicity, Distribution and Excretion of Emetine*. *J. Pharm. & Exper. Therap.* 1948, Dec., v 94, No 4, 431-8, 4 figs. [10 refs.]

In this investigation on the toxicity and metabolism of emetine in animals, two methods were used for estimation. The first, described by BRODIE *et al.* [this *Bulletin*, 1947, v 44, 793] in which methyl orange is the reagent can be used generally for organic bases but is not specific. By washing the ethylene dichloride tissue extract with phosphate buffer at pH 7.5 the method gave greater specificity and increased accuracy. Before extraction, the protein to which emetine is firmly bound was precipitated with trichloroacetic acid. The colour developed was read in a spectrophotometer at 540 m μ and then compared with standards. In a second method, use was made of the ultraviolet absorption curve of emetine as determined in a Beckman spectrophotometer. Details of the procedure should be consulted in the original.

Acute toxicity was determined in rat and mice by intraperitoneal injection. The LD₅₀ in mice was 62 mgm. per kilo. and in rats 17 mgm. per kilo. After administration of 40 mgm. emetine per kilo. to groups of mice the drug content of the whole animal was determined at intervals up to 35 days. The amount present decreased till the 8th day when approximately 35 per cent of the administered dose remained in the body and was approximately the same in amount until the 35th day indicating that the drug was slowly disposed of. These observations are in agreement with the fact that repeated small doses prove as toxic to animals as a single large dose. When the above dose was doubled the residual drug in the body was the same as above so that above a certain storage level emetine appears to be excreted or destroyed. Distribution in the different tissues of rat and dog showed that most was stored in the liver and may explain the drug's effectiveness in amoebic abscess of that organ. Smaller amounts were present in kidney spleen lung brain heart muscle and blood in that order. The small amount present in heart was surprising since it exert marked toxic effect on this organ. Urinary excretion alone was studied in the same animals and one human patient. Only traces of emetine could be found in a 24-hour sample and the drug was evidently not excreted to an appreciable extent by that route.

J. D. Fallon

I. RICKARDS, A. G. The Treatment of Amoebiasis with "Diodoquin." *J. Trop. Med. & Hyg.* 1949 Feb., v 52, No. 2, 33-8. (14 refs.)

II. *J. Trop. Med. & Hyg.* 1949 Feb., v 52, No. 2, 23-4. The Cyst Passer again.

I. This survey includes the treatment of 177 consecutive cases of amoebiasis of all grades treated with diodoquin. In all ambulant treatment was adopted. The post therapeutic supervision proved difficult as the men were demobilized a month after therapy was finished and all faeces examination thereafter had to be undertaken on specimens sent by post.

The criteria of cure consisted in the remission of symptoms and examination of not less than 8 faecal specimens within a period of not less than three months after cessation of therapy.

The series was grouped into —

Group I Asymptomatic.

Group II Asymptomatic with visible lesions on sigmoidoscopy.

Group III Symptomatic with no bowel lesions on sigmoidoscopy.

Group IV Symptomatic with bowel lesions on sigmoidoscopy.

171 fell into the first three groups. 98 were in Group I, 7 in Group II and 18 in Group III.

As the first three belong to the non-dysenteric type they may be considered together. Of these 119 were classed as cures, 16 as failures and 15 as having insufficient data.

The highest relapse rate (25 per cent) occurred among those treated by an eight-day course of diodoquin. This rate was reduced to 10 per cent among those receiving a fourteen-day course and to nil among those receiving a twenty-one-day course of therapy. Patients in Group IV were most unsatisfactory. All cases came from India and there was only one cure. In three diodoquin treatment was combined with E.B.I. Regarding toxicity the high sodium content of diodoquin precludes a greater potential danger of toxicity than does iodoform.

In the present series of 177 cases only 18 instances of untoward effect after administration of the drug were encountered. Pruritus and was the most prominent but was never a serious contraindication. Headache was not a prominent feature.

The disappearance of *Entamoeba histolytica* from the faeces showed a marked constancy in the first three groups and in only two could cysts be found five days after therapy was begun, but the interval of disappearance was longer in the last group of cases. *E. coli* and *I. bütschlii* were quickly eradicated, but *Giardia intestinalis* and *Endolimax nana* were resistant.

The usual dosage in the first three groups was 9 tablets (28.8 grams) *per diem*. From the results of treatment among the first three groups it is clear that there is a marked reduction in the relapse rate in those men treated for a longer period. It appears that less than twenty days treatment must be considered inadequate.

The maximum dosage was 1,123.2 grams (351 tablets) given within thirty-five days and no untoward reactions were produced.

The response to treatment was more marked in the acute forms of the disease when complete relief from symptoms was often obtained. One patient gained 7½ lb in weight within fifteen days and all the remaining cases showed such an initial dramatic clinical improvement. Sigmoidoscopic appearances ran a parallel course.

The earlier American reports of the efficacy of diodoquin have not been confirmed, but there is no doubt that it is a useful addition to the list of amoebicidal drugs and the main indication lies in the treatment of the symptomless cyst-passer on account of its low toxicity.

It should, however, never be used alone in the treatment of the disease, but is of real value when used in combination with emetine compounds. In an editorial commenting on this paper and a previous one by the same author [this *Bulletin*, 1949, 46, 361], reference is made to the problem of the cyst-passer and the significance of asymptomatic ex-servicemen returning to the community. The greater incidence and far greater morbidity from *E. histolytica* infection in this series among men returning from the India-Burma area as compared with those from the Mediterranean is discussed and it is suggested that some local factor is involved and that, perhaps, such a factor is absent altogether in temperate countries.

P. Manson-Bahr

LAVIER, CROSNIER & MERLE. Traitement de l'amibiase par la conessine [Treatment of Amoebiasis with Conessine]. *Rev. Paludisme et Med. Trop.* 1949 Jan 15, 7 No 56 1-8.

The authors and other French workers, have already recorded satisfactory results in the treatment of amoebiasis with conessine [this *Bulletin* 1948, 45 905 and 1086]. With further experience of it they confirm their view that conessine is the equal of emetine not only in the treatment of intestinal amoebiasis but in that of acute amoebic hepatitis. The drug is well tolerated by young patients and with habituation by others, though sedation is necessary in some cases.

A. R. D. Adams

LARSH, J. E. Jr & CHAFFEE, E. F. The Effectiveness of Carbarsone in rendering Young Mice Free of Intestinal Protozoa. *Science* 1948, Dec 24 725.

The common laboratory rodents are naturally infected with amoebae and attention has been drawn to this fact in connexion with the use of rats as experimental hosts for *E. histolytica* by FLITON & JOYNER [this *Bulletin* 1948, 45 430]. The present authors have attempted to free mice, kept under controlled conditions from intestinal protozoa by means of carbarsone. Groups of animals which received 50 to 300 mgm of the drug daily per kilo by mouth

for 10 days were not rendered protozoa free by this treatment. Doses up to 1,500 mgm. per kilo. proved effective in reducing their numbers but failed to eradicate them.

J D Fulton

NEAL, R. A. *Entamoeba muris*: a Complicating Factor in the Experimental Infection of Rats with *E. histolytica* [Correspondence] *Nature* 1949 Jan. 13 99-100 2 figs.

As recently pointed out by FULTON & JOYNER [this *Bullet* n 1949, v 45 430] the presence of natural amoebic infections in rodent used for experimental infection with *E. histolytica* may give rise to difficulty in interpretation of the results obtained. The present author indicates that infection with *E. muris* may be avoided by selection and care in maintenance of animals used. The effect of emetine and carbanone on young rats experimentally infected with *E. muris* through giving mature cysts in food, has been determined. Treatment by the drug-diet method was begun immediately after giving the infection and lasted for 6 days. The drug proved ineffective against *E. muris* as was found by HEGNER & ESKRIDGE (*J. Parasitology* 1939, v 22 408). Some morphological descriptions of the rat parasite are added.

J D Fulton

GRUBBS, M. Control of Hepatic Coccidiosis of Rabbits with Saccharothalathazole U.S.P. A Study of the Mode of Action of the Sulfonamides. *Arch. Pathology* 1948 Aug. v 46 No. 2 123-31

RELAPSING FEVER AND OTHER SPIROCHAETOSIS

GAMBLES, R. M. & COGHILL, V. F. Relapsing Fever in Cyprus. I. A. *J. of Med. & Parasit.* 1948 Dec., v 4, No. 74 288-303 1 map. 35 refs.

Relapsing fever has probably been endemic in Cyprus for many years but was not diagnosed until 1939 when spirochaetes were found in the blood of two gold miners suffering from fever. Between 1941 and 1943 98 soldiers contracted the disease and cases also occurred among the civilian population. The origin of some of these cases was discovered by WOOD & DIXON (this *Bullet.* 1946

43-44) they noted that the soldiers had been using caves or dungeons containing the tick *Ornithodoros tholozani*. The present authors extended these observations and discovered that the disease was widespread in Cyprus. Clinically the cases did not resemble the house-borne form and most of the patients were later proved to have been in contact with ticks. One of such ticks was sent to ADLER who was able to prove that it was infected with spirochaetes. Other transmission experiments with ticks were negative.

O. tholozani was found in nine different sites in Cyprus. Never found in human habitations the ticks occupied caves, rock shelters and once a ruined church. The ticks live in the dry earth or sand on the floor of the caves in rat holes or even in the earth at the base of a cliff below the cave. The ticks appear to flourish particularly where the floor is inches deep in guano. Infection takes place not only in people sheltering or sleeping in the caves but also in those merely visiting and crawling about in them. The prolegs of ticks attach to it, movements, attacking the legs and ankles and remaining in the clothing after engorgement. The tick probably feed on rodent man is only an accidental host. The only rodent reservoir of spirochaetes was investigated by examining the blood of 10 black rats and one spiny mouse from places known to be infected with the disease. The brains of nine of the rats were also inoculated into guinea-pigs. All the results were negative. Ticks were kept alive unfed for a long as 490 days.

P. C. C. Graham

ASHBEL R. Notes on *Spirochaeta persica* from Palestine and *Spirochaetes* of Relapsing Fever from the Western Desert (Tobruk Area) [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1949, Jan, v 42, No 4, 409-10

A summary of observations on thirteen strains of spirochaetes isolated from twelve patients and one tick (*Ornithodoros tholozani*) at Tobruk, and a comparison with strains of *Spirochaeta persica* from Palestine. The cases of relapsing fever occurred among soldiers in the Western Desert and the strains were supplied by Col. Boyd and Lt. Col. Little G.H.Q., Middle East Command.

Guinea-pigs were found to be highly susceptible to 11 of the Tobruk strains but resistant to two of them. After intraperitoneal injection the incubation period in guinea-pigs varied from 2 to 10 days, and there was no uniformity in the course of the infection. Some of the animals showed a heavy infection lasting about a fortnight without any relapse, while others had 3 and 4 relapses in the space of 2 or 3 weeks, and one individual even 5 relapses.

In the case of the Palestine strains an animal can be considered to have recovered when its blood remains negative for one month, but Tobruk strains can still be transmitted by the inoculation of heart blood 10 months after the disappearance of spirochaetes in thick drop examinations. In both strains the brain remains infective after the blood has become negative. In the case of the Palestine strains the brain has been shown to be infected 20 months longer than the blood in rats, and more than a year longer in guinea-pigs. The total period of brain infectivity with Tobruk spirochaetes has not yet been ascertained.

Guinea-pigs which have recovered from infection with Palestine strains remain immune to the same strains. In the case of the Tobruk strains some animals develop specific immunity, while others do not, and in the latter cases a second infection with the same strain produces an infection equally as heavy as the first. On the contrary, an animal infected with the Palestine strain, if inoculated with a new strain, develops an attack less severe than the previous one. It was noticed in Tobruk strains that the longer the incubation period in an animal, the more severely does it become infected, and some of these animals died with haemorrhages in the lungs, liver, peritoneum and brain.

Ornithodoros tholozani was shown to be capable of transmitting the Tobruk strains by bite. The contents of lice fed on monkeys infected with Tobruk strains remained infective to guinea-pigs for a maximum period of 48 hours.

E Hindle

HEISCH, R. B. The Human Louse in Transmission of *T. duttoni* in Nature. *Brit Med J* 1949, Jan 1, 17

It had been previously shown [this *Bulletin*, 1948, v 45, 603] that the human louse could act as a vector of *Treponema duttoni* in the laboratory. This organism is normally carried by *Ornithodoros* ticks, now the author has shown that it can develop in lice recovered from patients suffering from the *duttoni* form of relapsing fever.

Lice were collected from the clothes of patients, they were kept for periods up to three days and were then inoculated into susceptible animals. The animals became infected with a spirochaete which showed the typical characters of *T. duttoni*. It seems probable that the louse may therefore be a natural vector of the disease, though why epidemics of louse-borne *T. duttoni* do not occur remains a mystery.

P C C Garnham

YANG R. Y. & TU, Sou-chao. Treatment of Relapsing Fever at the Chengtu General Hospital. *Chinese Med J* 1948, Aug, v 66 No 8 426-30

1. The results of treatment of 79 proved cases of relapsing fever in the Chengtu General Hospital from 1942 to 1944 were presented

2. Thirty-eight cases treated with arsenic preparation 3-4 days after the crisis of the first attack showed no relapse after 12-20 days observation following injection except one case treated with mapharsen.

3. Of 40 cases treated before crisis, relapse occurred in 7 with one death.

4. Phenarsine hydrochloride was found to be as effective as neoarsphenamine but caused more reaction.

YAWS

HACKETT C. J. The Bone Lesions of Yaws in Uganda. A Clinical and Radiological Study (Thesis presented to the University of London for the Ph.D. degree in the Faculty of Medicine November 1947) Typewritten MSS 262 pp 1 map 2 graphs & 133 photographic figs. [43 refs.]

This work records an extensive radiological and clinical study of bone lesions in yaws carried out from 1937-40 while the author was holding a Senior Fellowship in Tropical Medicine of the Medical Research Council. Two visits were made to the Lango district of Uganda. During the first visit 940 cases of yaws with bone lesions were studied and 230 patients were re-examined during the second visit a year later. The period of observation of individual patient ranged from 6 to 18 months, and some 3,000 X-ray and 5,000 clinical photographs were made.

The Lango area just north of the equator is low undulating savanna country interspersed with swamps. It has an average rainfall of about 57 inches falling in two periods with maxima in May and August. The Lango tribe was pastoral but is becoming agricultural. The diet is largely vegetarian and probably poor in animal protein and fat. Infants are breast fed for one to two years. Young children are usually naked but adults wear simple clothes.

That the bone lesions described in this work were indeed due to yaws seems beyond question for the following reasons. The majority of the patients had generalized yaws lesions or had a history of such lesions. The bone changes formed a connected whole such as may be expected from a single aetiological agent and they resolved after treatment with neoarsphenamine. Syphilis appeared to be so rare that it could be excluded as a cause of the widespread bone lesions and for the purpose of this study yaws and syphilis are regarded as two different diseases. In Lango yaws is common (among the 14,000 yearly annual out patient 30 per cent. show evidence of yaws) and typical syphilis is rare whereas the opposite obtained at Masaka. The nature and sites of the lesions excluded tuberculosis or leprosy as the specific cause of the bone changes. Nutritional deficiencies may predispose yaws patients to the development of bone lesions but there was no evidence that such deficiencies in themselves accounted for the lesion.

Classification of yaws

Secondary lesions resemble the initial.

Generalized secondary lesions have a granular appearance and pirochaetes are readily demonstrable in serum from the lesions. These lesions are never destructive and leave insignificant scars on healing.

Later destructive ulceration develops which on healing leaves thin shiny deeply pigmented, atrophic scars. Lesions of this type are never present at the same time as secondary lesions nor do secondary lesions develop into them. These are tertiary lesions and pirochaetes are rarely found in them.

Latent secondary cases are those without skin lesions but whose bone lesions resemble those usually found with secondary lesions. Sometimes typical secondary skin lesions develop later.

Similarly latent tertiary cases are those without skin lesions but whose bone lesions resemble those of tertiary cases

Secondary lesions cease to relapse within a few years after infection. Tertiary lesions develop some years after infection and follow a symptom-free period. At any stage the disease may become inactive.

Bone lesions in the various stages of yaws

Secondary cases—Among 169 secondary cases (167 with skin lesions and 2 in the "pre-secondary stage") 20 per cent were under 2 years of age and 70 per cent below 5 years of age, 108 patients complained of bone pains, often nocturnal, 123 had thickening of bones with tenderness, 100 had the initial lesion or its scar, all had some type of skin lesion. From examinations of the patients 6 to 18 months later, it appeared that active bone lesions were nearly twice as frequent in patients with relapsed skin lesions as in those with resolved skin lesions. Younger patients suffered relapses of skin lesions more frequently than older ones. It appeared that the younger the patient, the shorter the duration of the yaws, and the less numerous the neo-arsphenamine or bismuth injections, the greater was the tendency of the skin lesions to relapse.

The majority of bone lesions commenced during the first or subsequent generalized skin eruptions. All active bone lesions tended to resolve spontaneously after a few weeks or months, but treatment hastened healing. No ulceration of bone lesions through skin or spontaneous fracture was seen.

The radiographic appearances indicated active changes (rarefactions, periosteal deposits), and inactive changes (cortical thickening and bony expansion, sabre-tibia), combinations of these changes occurred. Sabre-tibia was probably due to periosteal deposits which had become organized on to the anterior surface of the cortex and increased its convexity; there was no evidence that yaws played an important part in producing bowing of the tibial shaft.

Of the bones radiographed the ulna was probably most frequently involved, next in frequency were the hand bones, tibia and fibula, and lastly the foot bones and radius. In the hands and feet usually many bones were affected but the terminal phalanges, carpus and tarsus were unchanged. Apart from gonorrhea, no clinical evidence was found of involvement of the skull, ribs or vertebral column, and radiographically no changes were found in joints, although free fluid was occasionally present in the knee joints.

The periosteal deposits indicate active periostitis, and the cortical rarefactions a rarefying osteitis, cortical and periosteal rarefaction and periosteal deposits can be regarded as an osteoperiostitis. Cancellous tissue rarefaction which was occasionally observed in young children, probably indicates localized metaphyseal osteomyelitis.

There were 15 patients, 12 males and 3 females, with granulomatous plantar yaws: three with active bone lesions were under 8 years of age, while more of the other cases were over 15 years of age than under. Most had had yaws some years before and all complained of pains in the bones, or in the plantar lesions. Absence of radiological evidence of bone lesions in some patients with bone pain was probably due to the changes being insufficiently gross. Most of the patients showed bone changes that could well be attributed to previous secondary lesions, and the active bone lesions were comparable with those seen in secondary cases.

Latent Secondary Cases—There were 65 patients with no secondary yaws skin lesions but who were considered to be in a latent secondary stage. Of these, 18 had periosteal deposits only, 31 had cortical rarefactions and periosteal deposits, while of the remaining 16, 4 had cortical thickening and expansion,

3 organizing periosteal deposits, 4 inactive sabre-tibia, and 5 no bony abnormality. Fourteen of the first group of 18 patients were under 10 years of age and most had had yaws a year or more previously. Pain in thickened bones was the most frequent complaint. Many of the bones showed the results of earlier secondary yaws lesions, i.e. thickening and expansion and added to these were periosteal deposits similar to those seen in other secondary cases. One case when seen later had developed a further eruption of secondary skin yaws.

Twenty three of the second group of 31 patients were 10 years of age or under and in most cases yaws had been contracted some years previously. All complained of bone pain and had tender bony thickenings. The cortical rarefaction and periosteal deposits observed and the changes that occurred on resolution were comparable with those in the secondary cases although minor differences were observed and bony expansion and cortical thickening were more frequent.

All patients of the third group of 18 had yaws a year or more previously and most of them complained of bone pain. Their ages ranged from 4 to 20 years but 13 were between 8 and 18 years of age. In 5 cases no bony changes were present and 4 had sabre-tibiae. The changes in the other cases were comparable with those seen in other secondary cases. One case 18 months after the first observation had secondary palmar and plantar yaws.

Tertiary Cases.—One hundred and nineteen patients were regarded as having tertiary lesions. Radiologically they fell into 4 groups: 15 with small well-defined cortical rarefied foci, 48 with large well-defined cortical rarefied foci, 28 with ill-defined cortical foci and the remaining 30 patients.

Of the first group of 15 patients 9 were over 15 years of age and all had had yaws some years before. All complained of pain and in 7 the duration of the symptom was 9 months or over. Tender bony swellings or nodes were present in all patients together with small (1-3 mm diameter) cortical rarefactions. In two cases tertiary yaws skin ulceration was present and in one ulceration through the skin from a bone lesion occurred.

Of the second group of 48 patients 17 were 10 years of age or under while 19 were over 15 years. All had had yaws in most cases several years previously and all complained of pain, mainly in thickened and tender bones. In 18 patients the duration of the complaint was 12 months or less and in 30 over one year. Nodes on the skull and tertiary yaws ulceration were present in some cases. The tibia, ulna and radius were most frequently affected. The radiographic appearances consisted of moderately well-defined rarefied foci (5 mm diam.) in localized or extensive cortical thickening and expansion. Probably the earliest changes were rarefied foci in the cortex. Periosteal deposit then appeared and became organized. In these deposits the foci extended or in them some other foci appeared. On resolution periosteal deposit and rarefied foci disappeared and the expansion and cortical thickening were reduced although usually some expansion and thickening remained. During the height of activity in some cases ulceration occurred from the bone lesion through the skin. In many patients seen several months to a year after the first observation the bone lesions had resolved but in some they had persisted, enlarged or more recent lesions had appeared. In many cases the tibiae were bowed but no increase in this deformity was observed during the period of observation. In one patient there were gross lesions of the hip joint and in a few there were rarefied areas in the epiphyses or metaphyses. A spontaneous fracture of long bones was observed.

Of the third group of 28 patients 17 were 10 years of age or under and 11 were over 15 years of age. All had had yaws in most cases for a number of years and all complained of pain usually in thickened and tender bones. In over half the cases the duration of the complaint was 6 months or less and in nearly a

third it was a year or more. Tertiary skin lesions were present in some cases. In the radiographs, large ill-defined foci of rarefaction were found in the cortex which was often thickened, the changes were localized rather than generalized. The evolution of the lesions resembled that of the cases with large well-defined rarefied foci. Ulceration of bone lesions was also observed. In many patients the tibiae were bowed, but no alteration in this was found during the period of observation. In two cases there were destructive lesions of the articular surfaces of the elbow and knee. In one case there was ankylosis of the elbow and in another spontaneous fractures occurred in the ulna.

In the remaining group of 30 patients, one was 7 years of age and 26 were over 15 years. All had had yaws some years previously and all complained of pain in bones or skin lesions, in a number tertiary skin lesions were also observed. In the radiographs a variety of changes were present, including rarefactions, periosteal deposits, cortical thickening and arthritis. In two patients with hydrarthrosis and in three with tertiary skin ulceration, no change was found in the bones.

The characteristics of tertiary lesions in the hand bones were the relatively few bones involved and the destruction that often occurred, carpal bones were sometimes involved. Sinus formation, spontaneous fracture, shortening and deformity often developed, and some lesions were of long duration. The changes in the bones of the foot resembled those of the hand but were probably less frequent. The tertiary lesions in the skull comprised gangosa and areas of rarefaction in the normal or thickened cortex of the outer table of the calvarium. The cortical rarefactions were associated with fluctuant swellings which might undergo absorption or ulceration.

In tertiary cases, the periosteal deposits may be regarded as evidence of periostitis, and the rarefactions indicate localized areas of osteitis. Bony expansion and cortical thickening result from periosteal activity depositing bone on the surface of the cortex. In brief the radiographic appearances indicate a focal destructive inflammatory reaction of the various tissues of bone. Some lesions were more diffuse and less destructive.

It was noted that non-yaws ulceration was not associated with rarefied foci in underlying bones, although periosteal deposits and cortical thickening might be present. Slightly bowed tibiae were found in some patients who probably had not had yaws.

Summarizing the radiographic findings, secondary cases showed focal rarefactions in the cortex, and periosteal deposits in which rarefactions also occurred. As resolution proceeded, the rarefactions usually cleared up before the periosteal deposits were absorbed or became organized on to the surface of the cortex. Although in many lesions the bones finally returned nearly to normal appearance, cortical thickening and bone expansion sometimes resulted. In the tibia such changes might lead to increased convexity of its anterior profile (sabre-tibia) although actual bowing of the tibia is probably due to some factor other than yaws, possibly nutritional. In secondary bone lesions and, to a less extent, in tertiary lesions, spontaneous resolution in a few months was the rule, but healing was hastened by specific therapy.

Secondary bone lesions were not destructive, but recurrence of activity was not infrequent after apparent resolution. The dactylitis of this stage involved many of the metacarpals and phalanges, but the distal phalanges, carpus and tarsus were not affected. Often many long bones were involved. Spontaneous fractures, lesions of the skull except goundou, ribs and joints and ulceration of bone lesions through the skin were not observed. No change resembling active rickets or syphilitic osteochondritis was found.

In tertiary cases the main changes were small (1-3 mm) and large (5-10 mm) well-defined rarefied foci, and ill-defined foci (10-20 mm), in the cortex which

might or might not be thickened. Lesions were more localized than those in secondary cases. The rarefied foci were single or multiple discrete or confluent localized or extensive. Periosteal deposits were often present and in some cases the rarefactions extended into these or involved the medullary trunks. On resolution the periosteal deposits were usually absorbed or became organized on to the cortex before the cortical rarefactions were filled in. Although in a few cases no gross alterations in the bone resulted often some thickening and expansion remained.

Tertiary bone lesions were more destructive and lasted longer than secondary bone lesions. They often ulcerated through the skin. The skull ribs, clavicles and epiphyses were affected. A few instances of involvement of joints and of spontaneous fractures especially of the phalanges were observed. The vertebral column was not radiographed and no clinical evidence of its involvement was found at any stage. In the hands and feet one or only few bones were affected and bones of the carpus and tarsus were involved in the tertiary stage.

The bone changes associated with tertiary yaws skin lesions or with chronic non-specific skin ulceration consisted of periosteal deposits and cortical thickening and never of rarefied foci of any form.

A comparison of bone lesions of syphilis with those of yaws shows the great similarity between them. The periosteal deposits and cancellous tissue rarefactions of secondary yaws resemble changes of congenital and secondary acquired syphilis. Rarefactions in the cortex and in periosteal deposits in secondary yaws appear to be more marked and frequent than in congenital or acquired secondary syphilis. The periosteal deposits and cortical rarefactions of tertiary yaws closely resemble the gummatous lesions of late congenital syphilis and tertiary acquired syphilis. The bones affected in both diseases are similar. Joint lesions appear more frequent in syphilis. The absence in yaws of osteo-chondritis so characteristic of congenital syphilis may be due to the greater age of even the youngest yaws patient (over one year) while the greater frequency of dactylitis in yaws is a quantitative rather than a qualitative difference.

None of the points differentiating yaws and syphilitic bone lesions in published papers is applicable in general to yaws. previously reported differences seem to be based on a small number of cases and were found to be non-existent over the larger number and greater variety of cases forming the basis of the present study. In short, apart from the absence of osteo-chondritis in yaws there is probably no bone lesion that occurs in one disease that may not be observed in the other. There is, however need for a thorough investigation of the bone lesions of syphilis in Africans.

(Copies of this Thesis have been deposited in the Library of the London School of Hygiene and Tropical Medicine the Library of the University of London the Army Medical Library, Washington and the Library of the School of Public Health and Tropical Medicine, Sydney.)

F. M. GATROD

LEPROSY

BISHOP F. W. SCHRELAND L. G. & CARPENTER C. M. A Comparative Study by Electron Microscopy of the Morphology of *Mycobacterium leprae* and Cultivable Species of *Mycobacteria*. *Internat. J. Leprosy* 1948, July Sept. v 16 No 3 361-4 20 figs on 3 pl

This is an important paper illustrating varying appearances of acid fast bacilli greatly magnified under the electron microscope. The bacilli are freed

from tissue by repeated centrifuging and by taking a loopful from the top layer of the sediment, which contains most of them. Both the bacilli of human and rat leprosy were examined, together with cultivable acid-fast bacilli, e.g., *Myco tuberculosis*, *Myco smegmatis* and *Myco phlei* and the vole bacillus, and noteworthy differences between them are shown in illustrations of about 20,000 \times magnification, which should be studied by those interested. The morphological pattern of *Myco leprae* and *Myco leprae murium* is much the same, and they differ from the cultivable mycobacteria in their internal structure. Polar bodies of increased density are present in all the bacilli examined. Bodies of type A are large and opaque with no definite signs of internal arrangement, and they have been identified as nuclei of the cells, bipolar orientation is common. They were found in the bacilli of tubercle, leprosy and rat leprosy. Bodies of the B type are small and thin, generally more numerous and not so prominent as the A type. Care is necessary to exclude artefacts. Changes in morphology may be induced by exposure *in vitro* to saponified fractions of moogrol, to oleic acid, by boiling in 0.85 per cent saline and by strong bases or formaldehyde. This report is a preliminary one and further work on these lines will be awaited with interest. [Examination by the electron microscope of the acid-fast bacilli found by Moiser in cockroaches may well throw light on their real nature.]

L. Rogers

MANALANG, C. The Transmission of Leprosy. Reprinted from *Monthly Bull Bureau of Health* Manila 1948 July-Aug., v 24, No 4, 9 pp

FLOCH, H. & CAMAIN, R. Aspects histopathologiques de la lèpre en Guyane française [Histopathological Features of Leprosy in French Guiana] *Bull Acad Nat Méd* 1948, v 132, Nos 35/36, 601-5

The South American classification of leprosy of 1946 is based on histological changes, which are described in this paper as the result of 380 observations in 257 cases under treatment by the sulphones promin and diasone, in sections stained by haematin-eosin and by Ziehl's stain for bacteria. *Lepra bacilli* were found in 98 per cent of lepromatous cases, in 80 per cent of major tuberculoid, 22 per cent of minor tuberculoid and in 33 per cent of "indifferent" ones. Histological changes have confirmed in general the clinical diagnosis. Friction of cutaneous macules with caustic preparations produces infiltration with lymphocytes, histiocytes and fibrocytes and transforms anaesthetic into erythematous macules and leaves hyperpigmentation after several months. Histological examinations furnish more precise diagnostic indications than clinical ones. Moreover, histology reveals the persistence of tuberculoid changes after macules have lost their clinical tuberculoid appearance. The evolution of lesions under sulphone treatment can also be followed by means of histological examinations. The changes after treatment for a year corresponded with those described by FITZ & GEMAR [this *Bulletin*, 1946, v 43, 751]. These include a decrease in the vacuolated cells and an increase of lymphocytes and replacement of the leprosy tissues by connective tissue and decrease of the infiltration of the tissues. These modifications are most rapid and marked in recent lepromatous lesions. On the other hand, the histological appearances of tuberculoid and indolent lesions scarcely seem to be influenced by sulphone treatment. Histological examinations of sections for *lepra bacilli* are also more effective although not so quick, as in broken-up tissues, for *lepra bacilli* are found more frequently in sections if three or four specimens are examined especially in tuberculoid cases. The morphological changes in the bacilli can also be better observed in sections. Those situated near blood vessels are much more affected by sulphones in lepromatous lesions. On the other hand, the

bacilli of indifferent cases and in nerve trunks at a distance from blood vessels are little affected by sulphones. This explains the relatively slight action of sulphones in the last two types of leprosy lesions as compared with lepromatous ones.

L. Rogers

LEON BLANCO F. & FITZ, G. L. The Effect of Fixatives on Staining Procedures for Leprosy Bacilli in Tissues. *Internal J Leprosy* 1948, July-Sept., v 16 No 3 367-8, 1 pl.

"For the demonstration of leprosy bacilli in paraffin sections the following are recommended—(a) Fixation in Zenker's fluid (b) use of thin blocks, with minimal time in dehydrating and clearing fluids (c) staining by the oil soluble method, and (d) mounting in one of the modern synthetic mediums—clarite or permount—never in balsam.

ARNOLD H. L. Jr. The Intradermal Mecholyl Test for Anhidrosis; a Diagnostic Aid in Leprosy. *Internal J Leprosy* 1948, July-Sept., v 16 No 3 335-46 3 figs. on pl. [19 refs.]

The action of mecholyl chloride (stated to be pharmacologically virtually identical with acetylcholine) as a test for loss of sweating power in leprosy in place of pilocarpine is described in this paper. After a brief description of the physiology of sweating earlier reports on the use of mecholyl are summarized and the conclusion is arrived at that denervation of sweat glands by leprosy neuritis is the cause of anhidrosis usually affecting the most distal portions of the post-ganglionic nerve fibres. In carrying out the test equal areas of leprosy and adjoining healthy skin are painted with Minor's solution, consisting of crystalline iodine 2 grammes, castor oil 10 cc. made up to 100 cc. with absolute alcohol which dries rapidly. Then 0.05 to 0.1 cc. 1 per cent aqueous solution of mecholyl chloride injected intradermally at the border of the lesion. The whole area is quickly and lightly dusted with powdered starch from an atomizer. Within a few seconds sweat droplets appear on the functionally intact skin, which becomes black due to the iodine and starch combination. The response is negative when no sweat drops appear within the area tested. Quite exceptionally the reaction is doubtful if no more than 6 to 8 pinpoint-sized droplets can be seen on the area tested. In facial lesion it is doubtful if this test can be relied on as in the oval, hypopigmented, facial macules of *arhroma parasitica* a sweat response is liable to be absent and not one of a series of these cases has developed leprosy. Macular or tuberculous annular lesions showed the area of anhidrosis to correspond exactly with the area of innumerable and demonstrable anaesthesia and the reaction is clear cut and evident even in dark skinned patients.

L. Rogers

VILARÓ, A. & ESTILLER, J. La radiografía de los nervios ciliares en los enfermos de lepra. [Radiography of the Ulnar Nerves in Leprosy Patients.] *Internal J Leprosy* 1948, July-Sept. 16 No 3 351-60 10 figs. on 4 pls. English summary.

The English summary of this paper states that the authors first give a brief review of the subject and then give their personal experience with this method of examination in support of the existence of the fibrous reactive leprosy of their classification. After proving the safety of their technique and the selection of thorotrast as the contrast substance they carried out experiments in the cadaver. The ulnar nerve should be exposed surgically and thorotrast injected

in an upward direction with some pressure in amounts of 1.5 to 3 cc, and they report on 8 cases of fibrous reactive leprosy and 3 of tuberculoid reactive leprosy. The X-ray pictures are difficult to interpret and they only draw final conclusions regarding the fibrous reactive cases, namely that "in classifying leprosy histologically the fibrous substratum has so dominant a role that in many of the patients there is not the slightest suspicion of a previous tuberculoid or lepromatous stage"

L Rogers

DHARMENDRA & MUKERJEE, N. The Treatment of Leprosy with Hydnocarpus Remedies. *Leprosy in India* 1947 Apr v 19, No 2, 36-43 6 figs on 4 pls

FLOCH, H & CAMAIN, R. Traitement de la lèpre par les sulfones (promin et diasone) en Guyane française [Treatment of Leprosy by Sulphones in French Guiana] *Bull Acad, Nat Méd* 1948, v 132, Nos 35/36, 606-10

This is a report on a trial of promin or of diasone in 52 cases for eight up to twenty months with favourable results in pre-lepromatous or lepromatous cases of a very similar nature to those already reported by others, but also dealing with indifferent and tuberculoid cases. Promin was given in daily doses gradually increased from 1 gramme to 2½ gramme and 5 gramme doses. Improvement of different degrees was observed in all, but was most marked in young subjects. Nine cases of the indifferent type were treated in young subjects, with improvement in six, no change in one and aggravation of the symptoms in two. The greatest benefit was seen in two pre-lepromatous cases. Of three tuberculoid cases in young subjects two remained stationary and one was worse. Cases which improved also showed favourable histological changes. Diasone was used in the usual doses in nine lepromatous cases with improvement in all of a similar nature to those obtained with promin. Of twelve indifferent cases in young people five improved and seven remained stationary. Of three reactionary tuberculoid cases and seven tuberculoid minor ones, nearly all in young persons, the first three lost their reactionary character, as often occurs without treatment. Of the remaining seven two were better, two unchanged and three were worse. The histological changes were similar to those after promin and reactions were not observed. Any anaemia was easily arrested by iron treatment. The lepra bacilli became granular, broke up and eventually disappeared in favourable cases and especially in the more vascular lesions. Neural cases with few bacilli were least favourably influenced by sulphone treatment.

L Rogers

SLOAN, N R. Effects of Sulfone Treatment on the Larynx in Leprosy. *Internat J Leprosy* 1948, July-Sept, v 16, No 3, 329-33

The author records further evidence in support of his earlier experience of the favourable effects of sulphones in leprosy laryngitis in Hawaii. During less than two years up to the middle of March, 1948, 116 patients were treated with promin, and 114 with diasone and 15 with promizole. Of 197 patients never subjected to tracheotomy, 45 lepromatous ones had the cardinal symptoms of hoarseness or dyspnoea or both, but 37 of them (82 per cent) improved apparently as the result of treatment and the remaining 8 only complained of hoarseness after short treatment. Of the improved cases at least two were saved from tracheotomy. A striking fact is that only one patient early in his treatment required this operation against 7 to 17 every year before sulphones were used. Moreover 9 patients have been able to remove their tubes, presumably as the result of sulphone treatment. Of 30 other patients, marked improvement in breathing and voice were noted in 19. Choking spells have

also been greatly relieved and chronic bronchitis due to tracheal tubes has disappeared. When a patient can inhale deeply with a finger over his tube and with little or no retraction of the suprasternal notch and the cords—if they are visible—which may not be the case—move freely the opening of the tube is covered with adhesive tape. If the patient is able to breathe naturally for some days the tube may be removed and a dressing applied under which healing may take place unless the sinus is lined with epithelium, when an operation may be necessary to close the opening. The author concludes that improvement in laryngeal lesions is perhaps the most striking result of sulphone treatment in leprosy.

L. Rogers

FERNANDEZ J. M. M., CARBONI E. V., TOMASINO J. & GIMENEZ M. M. Hematologic Study of Leprosy Patients treated with Diamine. *Internat J Leprosy* 1948, July-Sept v 16 No 3 319-77 2 figs.

This is a careful study of the blood changes that follow the use of diamine in leprosy. Anaemia and depression were noted in 89 per cent. of cases and most marked when the daily dose exceeded one gramme. They may appear during the first few weeks of treatment and subside on withdrawal of the drug. The red cells only exceptionally decrease by more than two million and the haemoglobin to under 50 per cent. even the worst cases respond favourably to withdrawal of the drug and the use of iron, liver and vitamin B complex. Severe leucopenia was not met with and there was an increase of reticulocytes proportional to the severity of the anaemia. This indicates that the bone marrow is unharmed and the anaemia of the regenerative type. Urobilin—but not bile pigment—is found in the urine and red-cell resistance is decreased; these indicate a toxic haemolytic effect. Indirect bilirubin determination was almost always negative. The anaemia is thus benign and rarely requires interruption of the treatment especially if the daily dosage is restricted to one gramme daily.

L. Rogers

D. SOTTA ARACIO H. C. Antileprosy Institutions in Brazil. Present Situation of the Federal, State and Private Organizations. *Internat J Leprosy* 1948 A 2 Sept 18 No 3 369-80

CHURTO S. Reorientation of the Control of Leprosy with Emphasis on Infantile Susceptibility. Reprinted from *Monthly Bull Bureau of Health*, Manila 1948 J 1 Aug v 4 No 4 13 pp 16 refs

CHURTO S. Leprosy Control based on Transmission, Susceptibility and Pathogenesis. Reprinted from *Monthly Bull Bureau of Health*, Manila 1948, July A 2 v 4 N 4 13 pp 26 ref

HELMINTHIASIS

CALL ROY RODRIGUES Judith. Algunos datos sobre antelminticos intestinales [Observations on Intestinal Anthelmintics]. *Medicina Moderna* 1948 Dec 10 24 No 569 507 18 2 mercurous ref

A survey and review of the literature

DA SILVA J. R. Novos aspectos da terapêutica da esquistossomose mansoni. [New Aspects in the Treatment of Schistosomiasis mansoni]. Reprinted from *Boletim Medico* 1948 Dec 15 N 4 13 pp 4 refs

It is not easy to see in what respect these papers are new. The author sketches the results which various investigators of repute have reported from the use of emetine hydrochloride, tartar emetic and quinine in infections by

Sch. mansoni and enters a further plea for proof of results by examination of ova obtained by rectal biopsy—a method to be preferred to faecal examination [See this *Bulletin*, 1949, v 46, 377] H Harold Scott

KIKUTH, W & GÖNNERT, R Experimental Studies on the Therapy of Schistosomiasis *Ann Trop Med & Parasit* 1948, Dec, v 42, Nos 3/4, 256-67

Antimony compounds such as tartar emetic and foudadin and also emetine have been used in the treatment of schistosomiasis. The aim of the present therapeutic investigation was the discovery of a substance which could be given orally in the mass treatment of the infection. The researches were begun in 1932 and since *Schistosoma mansoni* develops to maturity in white mice it was employed chiefly in that host and in rhesus monkeys throughout these studies.

The vector snail was *Planorbis guadaloupensis* [*Australorbis glabratus*] and was maintained in small tanks with filtered water and sandy bottom in which various water plants were grown at a temperature of 26 to 28°C. The snails were fed on lettuce, small crustaceans, liver and earthworms. Ultra-violet irradiation at first aided cultivation of the snails but was later dispensed with. In order to infect the latter, washed eggs of *S. mansoni* from infected faeces were illuminated in water at 40°C. Miracidia soon emerged and infected snails placed in the water, one for each 30 schistosome eggs. At 26 to 28°C the development to the cercarial stage in the snails occupied 4 to 7 weeks. The cercariae generally emerged at midday under the influence of heat and light and could be counted in suspension after being killed with formalin. Instead of immersing the animal to be infected, cercariae from different snails (to ensure mixing of the sexes), were injected subcutaneously, 50 to 60 for a mouse and 200 to 300 for a monkey. Sexual maturity of the schistosomes was attained in mice in about 6 weeks, when 2 to 12 pairs were usually present. Eggs were regularly present in faeces after the 48th day and chemotherapeutic tests were then begun.

The drug was given by mouth on 6 successive days. When treatment was directed against immature worms, the drug was given on the 33rd day after infection. The excretion of eggs while the animal was alive, the presence of live worms, eggs and pigment in the liver as well as the condition of dead worms all served as criteria of the effectiveness of a drug. On testing a large number of drugs, the active xanthenes and thioxanthenes named Miracil A, B, C and D, etc., were discovered. Cure could in some cases be effected by a single dose and it should be noted that "stools do not become free from eggs until 14 days after the beginning of treatment, even when a cure has been produced". The action of miracils was more pronounced against sexually mature forms. The activity of these compounds varied in the mouse and monkey host. Because of the favourable results obtained in monkeys, Miracil D was suggested for trial in human patients, but clinical tests could not be carried out by the authors on account of the late war. Reports on the clinical use of the drug by BLAIR *et al* and WATSON *et al* have appeared [this *Bulletin*, 1948, v 45, 526, 1018]. Details of the pharmacology of Miracil D are also recorded [*ibid*, 798]. These substances cause considerable changes, especially in female worms. Intestine, gonads and yolk-cells are affected and egg-production is disturbed. Their particular action on sex-organs may explain why immature worms are less susceptible.

J D Fulton

VOGEL, H & MINNING, W The Action of Miracil in *Schistosoma japonicum* Infections in Laboratory Animals *Ann Trop Med & Parasit* 1948, Dec, v 42, Nos 3/4, 268-70

In the preceding abstract, KIKUTH & GÖNNERT report favourably on the action of certain Miracil compounds (xanthenes and thioxanthenes) against

Schistosoma mansoni infections of mice and monkeys. In the present investigation rabbit, golden hamsters and rhesus monkeys infected with *S. japonicum* by the authors' own method were used (*Acta Trop.*, 1947, 4, 1-97). When infection was established as shown by the discharge of ova, drug treatment was given by stomach tube or subcutaneously. Six different Miracid compounds including Miracid A, B, C and D were used in doses which had proved effective against *S. mansoni*. Results were judged by daily examination of faeces and later by autopsies when the worms were collected from blood vessel, chiefly mesenteric vein, and examined. Attention was also paid to the viability of ova from intestinal mucosa. After taining of the worms slight effects of the drugs were noted in sex organ, and some worms were possibly smaller than normal. They were however not destroyed nor was the discharge of ova interrupted. This finding was in contrast to the effectiveness of the same Miracid against *S. mansoni*. J. D. Fawcett

OLIVER, L. A Note on Schistosomiasis in Eastern Japan. *Amer. J. Trop. Med.* 1948, Vol. 7, No. 6, 857-75, 2 figs.

Five schistosomiasis endemic areas are known to exist in Japan. That extending along the Tone River to the north and east of Tokyo is an important rice-growing region. The presence of *Schistosoma japonicum* infestation was here first demonstrated in 1914, although it has since been found in other localities; the endemic foci have not been clearly defined. The author received information collected from available report and literature on the subject and has been able to add to this by a limited investigation of part of the Tone area. A total of 11 children, between 8 and 14 years of age, of 97 in an elementary school at Koya were shown, on the basis of a single stool examination to harbour *S. japonicum*; one of 4 children at Ono school, some 3 kilometres distant, was found infected. Cercariae of *S. japonicum* were recovered from specimens of *Oncomelania nasophora* from limited areas in the wet grassy parts of this district. The author believes the disease could be eradicated from the Koya area, as the distribution of infected snails is limited. Infected area can be avoided, and those who have to enter them to cut grass could wear protective clothing. Local instruction of the population should produce satisfactory results.

A. R. D. Adams

See also p. 428 HAY, Maharia in Southern and Western Szechuan with a Note on the Occurrence of *Schistosomiasis japonicum*

DYSCHEIDT, R. & PICK, F. Conservation de *Haemon urasoni* (Corynephium 1934) amphistome de l'homme et des primates dans des conditions extérieures à l'hôte. Preservation of *Haemon urasoni* under Artificial Conditions. *Hull. Soc. Path. Exot.* 1938, 41, Vol. 78, 490-94

Mature amphistomes (*Haemon urasoni*) were obtained from several balloons (*Pafr. sphaerus*) after autopsy and placed in various media at temperatures of 37°C, 20°C, 5°C and 0°C with the object of finding a method of keeping the worms alive outside the host. The most successful medium in which the worms remained alive for 18 days consisted of a mixture of extract of beef heart jelly and 8 per cent physiological saline at pH 7.6. The optimum temperature proved to be 37°C. The worms were also kept alive for 13 days in a simple liquid medium consisting of one part of horse serum and seven parts of Ringer solution at pH 7.6. These results are maintained to have practical value in facilitating certain biological studies and also in investigation of resistance to anthelmintics. J. J. C. Buckley

ESKOLA, O On Reticulocytosis in Anaemia Perniciosa *Diphyllobothrica* during Liver Treatment, with consideration of the various Types *Ann Med Intern Feminae* 1948, v 37, No 2, 91-115 [31 refs]

The author has studied the reticulocyte response in 19 cases of anaemia associated with *Diphyllobothrium* infection, during treatment. The worm was removed by a dose of 3.5 to 4.0 grammes of oleo-resin of aspidium (*Filix mas*) followed by Epsom salts. An injection of 5 ml (or 4 ml) of Campolon was given on three successive days and then 15 ml of liver extract daily by mouth. After an initial complete blood count and sternal puncture, differential reticulocyte counts were made daily and the sternal punctures were repeated each day up to the crisis and at the conclusion of treatment.

The author recognizes five groups of reticulocytes—(0) nucleated, (I) glomerulo form, (II) reticular, (III) imperfect reticular, (IV) maturing form with small reticular remnants only.

In six normal controls there was no change in the reticulocyte percentages during treatment. In the peripheral blood the reticulocytes ranged from 0.2 to 1.0 per cent and the ratios were groups I+II groups III+IV 1.67 to 1.115 (average 1.86), whereas in the bone marrow smears they ranged from 0.4 to 2.2 per cent with the ratios of groups I and II groups III and IV 1.11 to 1.4 (average 1.24).

In the infected cases, the reticulocyte percentage in the peripheral blood was from 0.3 to 2.8 (average 1.1), and in the bone marrow it was 1 to 4 times that in the peripheral blood. The average ratio of the reticulocyte groups I+II III+IV was 1.109 (cf normal 1.86) in the peripheral blood, and 1.36 (cf normal 1.24) in the bone marrow, that is, the maturer forms are more abundant as a result of the slow emission from the bone marrow.

During treatment the reticulocyte percentage in the peripheral blood reached its peak (reticulocyte crisis) in 3 to 8 days. In patients with less than 2.5 million red cells per cmm initially, the maximum percentage was always over 8, the highest being 22. In the bone marrow the crisis occurred on the same day or the day before.

During treatment the younger reticulocytes began to increase at a greater rate than the older ones, so that there was a shift to the left in the reticulocyte picture. This was most striking in the severe cases, in which the ratio I+II III+IV changed from 1.124 before treatment to 1.43 during treatment.

This shift reached its maximum point on the day of, or on the day before, the reticulocyte crisis. It was apparent in both the peripheral blood and the bone marrow. After removal of the worms alone, the reticulocyte crisis occurs a few days later.

L. E. Napier

ESKOLA, O Bone Marrow Picture in Early Remission of Pernicious Tape-Worm Anaemia *Ann Med Intern Feminae* 1948, v 37, No 2, 116-42 [40 refs]

A series of 6 normal controls and 19 cases of *Diphyllobothrium* anaemia were studied before and after treatment.

In the 6 normal controls, the sternal marrow counts were similar to those given by other investigators with minor but not constant variations, and no material change was observed after liver administration. The erythroblastic series were from 20 per cent to 29 per cent of the total nucleated count and of these about 70 per cent were normoblasts, most of the rest being macroblasts, there were no megaloblasts.

In 12 cases of anaemia the worms were first removed by the administration of oleo-resin of aspidium (*Filix mas*) and Epsom salts before liver extract

(Campokin 5 ml. by injection followed by 15 ml. by mouth twice daily) was given and in 7 the liver extract was given first, the worms not being removed.

In the untreated cases with severe anaemia—less than 1.5 million erythrocytes—the total erythroblast counts were from 41 per cent. to 64 per cent. of which from nil to 17 per cent. were normoblasts, 23 to 40 per cent. were proerythroblasts, and 19 to 33 per cent. megaloblasts. After liver administration the total erythroblast percentage rose further and the proerythroblasts and megaloblasts disappeared within a day or two. At the end of a week a few macroblasts only remained, over 95 per cent. of the still high total red cell series being normoblasts, and after another month 100 per cent. were normoblasts, but meanwhile the total erythroblasts had fallen to 10 to 7 per cent. of the total nucleated cell count. In the less severe cases, the changes were less pronounced but materially the same.

In the severe cases in which the worms were not removed, there was at first a reduction in proerythroblasts and megaloblasts, but later these returned to more or less their pre-treatment percentages. However there was little change in the erythroblast/leucoblast ratio and no increase in peripheral blood red cell count.

Myeloblasts were found in the bone marrow of the cases of anaemia prior to the treatment, 14.7 to 33.8 per cent., with an average of 20.5 per cent. With intensive liver treatment they disappeared on the second or the third day of treatment. In the worm-carrier cases which were given inadequate liver treatment they decreased to 0.6 to 1.7 per cent. on the third or the fourth day of treatment, after which they increased again.

The leukopoietic bone-marrow picture prior to the treatment was nearly normal, with regard to the percentages, or it showed a slight shift to the left as regards numbers, however it was increased. During intensive liver treatment, it subsided to normal level and moved slightly to the right.

Three to 7 weeks after the commencement of abundant liver treatment, a comparatively strong lymphocytosis (22 to 48 per cent. of all nucleated cells) occurred.

L. E. V. JAY

McMURTRY W. H. & VICKERS, A. A. Cysticercosis. Discussion and Presentation of a Case. *Brit. J. Radiol.* 1949 Feb. v. 22, No. 261, 84-7 3 figs.

GAULT E. W. & BALASUBRAMANYAN M. A Case of Cerebral Cysticercosis. *J. Path. & Bact.* 1948, July v. 60 No. 3 505-8 3 figs. on pl.

"A rapidly fatal case of cerebral cysticercosis is reported. The patient, a Hindu girl aged 14 had symptoms suggestive of cerebral tumour. The adult worm was found in the small intestine. The cysts showed no evidence of calcification and the cysticerci were alive. An intense inflammatory reaction had developed around the cysts and was considered to be responsible for the symptoms."

SAINT C. F. M. Hydatid Disease: some Features, Familiar and not so Familiar. *C. Proc. Cape Town.* 1948, Oct. 7 No. 10 115-28 19 figs.

An account which would—possibly do!—furnish a good clinical lecture on the subject of hydatid disease excellently illustrated by photographs. The main interest lies in the account of cysts being found in unusual situations, such as the erector spinae, the body of the kidney, the parotid, the neck, the orbit and behind the eye.

H. Harold Scott

CENDAN ALFONZO, J. E. Relaciones de la hidatidosis hepática con la litiasis biliar. Litiasis hidática. Litiasis parahidática. Litiasis biliar común. [Relation of Hydatid Infection to Biliary Lithiasis.] *An. Facul. de Med. Montevideo* 1948, v 33, Nos 8-9 & 10, 879-956, 9 figs. [57 refs.]

PEREIRA, O. Observações sobre a ação do hexylresorcinol e tetrachloretileno nas infestações pelos ancilostomídeos, *Ascaris lumbricoides*, *Trichocephalus trichiura* e sua aplicabilidade no meio rural. [On the Effects of Hexylresorcinol and Tetrachlorethylene in Ankylostomiasis, Ascariasis and Trichuriasis in Country Districts.] *Rev. Serviço Especial de Saúde Pública* Rio de Janeiro 1948, July, v 2, No 1, 47-58, 2 charts. English summary (7 lines).

Measures to combat these helminthic infestations are largely educational and sanitary engineering, but treatment of patients is a necessary adjunct. It is with the latter that the author deals here. With these drugs he treated 607 schoolchildren between the ages of 7 and 16 in various educational establishments in Vitória, Espírito Santo, and 70 in Pedra Furada, a municipality of Minas Gerais. The 677 were divided into five groups. I. Receiving one treatment with hexylresorcinol—0.4 gm. for those under 6 years [but the ages are stated to be between 7 and 16], 0.6 gm. for those between 6 and 8 years, 0.8 gm. for the 9-12-year-olds, 1.0 mg. for those 13 years or over. II. Two treatments with hexylresorcinol, with an interval of 20 days. III. One treatment by tetrachlorethylene, 2 cc. in two doses one hour apart, and a saline purge one hour after the second cc. IV. Two treatments with tetrachlorethylene with a 20 day interval. V. Treatment first by cristoids [hexylresorcinol?] and then by tetrachlorethylene after an interval of 20 days.

The results of treatment were estimated by comparing the egg-content per gramme of faeces by the Stoll-Hausheer method before and after the treatment. For a more detailed study the patients were graded according to the degree of infestation. Those with ankylostomes were put into 4 groups: (1) with less than 500 ova per gm. of faeces, (2) those with 500-2,000 per gm., (3) those with 2,000-5,000, and (4) those with more than 5,000.

For *Ascaris*: (1) Those with up to 20,000 ova per gm., (2) those with 20,000-50,000, (3) those with 50,000-80,000, and (4) those with more than 80,000.

The use of the two drugs together reduced the figures by 94 per cent. for these two helminths, 98.5 per cent. of *Ascaris*, and 93.9 of ankylostomes. A single treatment by tetrachlorethylene alone was good in mild infestations by hookworms, it was useless in a little more than 60 per cent. of patients treated. Hexylresorcinol proved excellent for *Ascaris* infestation: with one course, 10 out of 38 with more than 80,000 ova per gm. were cured, with two courses 24 out of 25.

On *Trichuris* infestations the effects were poor: whether the drugs were used singly or in sequence and in one or two courses. Only 11.7 per cent. were returned as negative.

In conclusion tetrachlorethylene has certain drawbacks to its use in rural districts: and the need for a saline purgative 3-4 or more hours after the drug is taken brings about such an outpouring of bile that the anthelmintic action is neutralized. Hexylresorcinol, however, is given once only and the patient can return to his normal activities: moreover, it is easier to take, as it is given in capsule form. The latter is therefore to be preferred for mass treatment in rural districts.

H. Harold Scott

MAO C. P. Occurrence of Dog Hookworm (*Ancylostoma caninum*) in Man. *Chinese Med J* Chengtu Edition. 1945 Apr v 63A No 3 130-32, 8 figs. (10 refs.)

Report of a case stated to be the second in the literature

CATTAN R. FRUMUSAN P & COUSIN R. Syndrome de Loeffler symptomatique d'ascaridose au decours d'un infarctus pulmonaire suppure (Loeffler's Syndrome as Evidence of Ascaris Infection complicating a Septic Pulmonary Infarct.) *Bull et Mém. Soc. Méd. Hôp. de Paris* 1949 Nov 1/2, 279

A patient of 57 was undergoing treatment for an infarct of the left lung. Routine blood examination showed 7 per cent eosinophiles which increased to 31 per cent within the next month. An X-ray examination now showed a hazy infiltration of the right lung (this shadow had not been present at a previous routine X-ray examination (although evidence of the lesion in it

During this time the patient expelled the worms. Despit this and the disappearance of the X-ray signs, the eosinophilia persisted at 24 per cent accompanied by a total decrease of granulocytes (39 per cent).

The special interest of this case lies in the fact that the time from the appearance of the fleeting infiltration in the right lung to the expulsion of the worms was only 20 days. Usually in such cases one has to wait two months or more before finding ova in the stools and hence incriminating *Ascaris* as the cause of the manifestations.

H. J. O'D. Huxley

ROGERS, W. P & LAZARUS, Marian. Glycolysis and Related Phosphorus Metabolism in Parasitic Nematodes. *Parasitology* 1949 F b. v 39 Nos 3 & 4 772-18, 6 figs. (40 refs.)

CRANCH, M. R. A. & DIMMICK, P. The Water-Soluble Vitamins of Parasitic Worms. *Parasitology* 1949 F b. v 39 Nos 3 & 4 300-301

ROGERS, W. P & LAZARUS, Marian. The Uptake of Radioactive Phosphorus from Host Tissues and Fluids by Nematode Parasites. *Par. & M.* 1949 F b. v 39, Nos 3 & 4 45-57, 5 figs. (20 refs.)

TRIM, A. R. The Kinetics of the Penetration of some Representative Anthelmintics and Related Compounds into *Ascaris* (see *excerpts* var. in *Parasitology* 1949 F b. v 39 Nos 3 & 4 281-80, 9 figs. 19 refs.)

CARTER, H. F. Records of Filaria Infections in Mosquitoes in Ceylon. 4 p. *Trop. Med. & Paras.* 1949 Dec v 42 Nos 3 & 4 31. 1 map & 4 figs. on pl.

These records relate to filaria infections found in mosquitoes caught under natural conditions in Ceylon and the Maldives Island. No experimental infections in laboratory-bred mosquitoes are included. The results obtained from different localities have been grouped in relation to the known endemicity of the human parasites *W. bancrofti* and *W. malayi* but it does not follow that all the infections recorded from endemic areas are necessarily of human origin; many may have been derived from domestic animals.

Three separate investigations were undertaken in the North Western Province. In the first investigation mosquitoes were collected from the villages at least once each month over a period of 3-4 days by hand-catching in the mornings and by trapping in the evenings. In the third they were collected during the night from cattle huts by pools.

In the first series, 8,500 mosquitoes were dissected. Filaria infections were found in 31 from the endemic villages and in 11 from the others. The majority were caught in cattle-baited traps. In the second series of observations, 35,000 mosquitoes were collected. Approximately 32 per cent of the total catch for both villages were obtained from houses, 10 per cent from human-baited traps, and 58 from cattle-baited traps. The predominant mosquitoes were *Anopheles subpictus*, *Culex tritaeniorhynchus*, *Aedes pallidostriatus*, *Mansonioides uniformis*, and *Aedes pipersalatus*. In cattle-baited traps the most prevalent was *C tritaeniorhynchus*. Infections with filaria larvae were found in 83 mosquitoes. 32 (in 8,325 dissected) from one village and 51 (8,932 dissected) from the other.

From May 1932 to March 1933, the village of Akaragama near Kurunegala was used as an entomological station and from observations made there is reason to believe that the great majority of filaria infections found in mosquitoes were not of human origin. Of 7,000 mosquitoes caught 24 species of culicines and 12 anophelines were represented. Approximately 2,500 mosquitoes were dissected and examined. 172 were found to harbour filarial larvae.

In the Eastern Province, Toppur, a Muslim village, is situated at the northern extremity of a large lake where *W. malayi* filariasis is severely endemic. In November 1932, of 1,944 mosquitoes collected over 70 per cent were *Mansonioides*. Filarial larvae were found in 54 mosquitoes, all but one being species of *Mansonioides*.

In the Western Province, although cases of filariasis have been reported, the data available did not suggest that it was prevalent.

In the suburban areas of Colombo, of 2,500 blood films examined 130 have shown microfilariae. All were embryos of *W. bancrofti*.

In the houses, *Culex fatigans* was the dominant mosquito. Infections with filarial larvae were found in 87, giving an infection rate of 8.8. Of three infected mosquitoes, *M. uniformis*, caught in cattle-baited traps two harboured small developing forms in the thoracic muscles, and in another (*Armigeres obthurbanus*) three mature larvae were found in the proboscis.

These investigations showed clearly that filariasis due to *W. bancrofti* is widespread throughout the suburbs of Colombo and that the essential carrier is *Culex fatigans*.

The records for the Maldives Islands relative to the most southerly of the atolls were obtained during a brief visit made in the latter part of February and early March, 1943. Although microfilariae were found sparingly in the blood of 84 residents in the daytime, no night specimens could be collected. Of 196 female mosquitoes (159 *C. fatigans*) which were examined for filarial larvae, twelve (11 *C. fatigans* and one *C. sitiens*) were infected. In *C. fatigans* collected in the village of Hittadu the infection rate was 6.6, and in the island, where elephantiasis cases are segregated, it was 8.0 per cent. *P. Manson-Bahr*

EHRLICH, W. E., SEIFTER, J., ALBURN, H. E. & BEGANY, A. J. Heparin and Heparinocytes in Elephantiasis Scroli. *Proc Soc Exper Biol & Med* 1949, Jan, v 70, No 1, 183-4, 2 figs [15 refs.]

"Microscopic examination of a human scrotum amputated because of elephantiasis showed numerous heparinocytes around lymph and blood vessels. One hundred and twenty-six mg of purified heparin per kg of wet tissue was obtained. Based on the purified material, the scrotum contained at least 16,380 I U of activity per kg of fresh tissue. These findings are further evidence that mast cells are sources of heparin. They also explain the absence of thrombosis in elephantiasis."

HERSHAW W. E., WILLIAMSON J. & BENTHAM D. S. Chemoprophylaxis of Experimental Filariasis in the Cotton-Rat. *Brit Med J* 1949 Jan 2, 130-32. [15 refs.]

The authors have shown (this *Bullet* 1949 v 46 69) that the results obtained in chemotherapeutic tests with wild cotton rats naturally infected with *L. canis* must be interpreted with caution and after due consideration of the course of infection in untreated controls. They do not consider that infections produced in rats by colonies of mites (*Liponyssus dactyl*) maintained in a rat nest and previously fed on the infected occupant are suitable for chemotherapeutic tests. In order to a void unknown factors inherent in the above method of infection they have exposed rats to controlled infection by about 20 mites per animal for approximately 24 hours as previous work had shown that they were efficient vectors. In a group of 41 rats exposed to infection in this way engorged mites were recovered from 37 of the rats and 35 of them (95 per cent) later had microfilariae in their blood. Observation has shown (this *Bullet* 1948 v 45 285) that all worms are not transmitted from the mites in their first infected blood meal. To estimate the probable number transmitted to a rat, dissections of a series of the mites was made before and of engorged mites after the transmission meal.

This method of producing controlled infection has been employed in preliminary experiments on the prophylactic action of drug. Since antrypol (Bayer 205 paramm) stilbamidine and MSb (a pentavalent antimony compound prepared by FRIEDRICH *et al* whose constitution is *p*-methylsulphonyl stibonate (see this *Bullet* 1948, 43 114) are known to be active prophylactic agents against trypanosome infection they were tested for similar properties against filarial infection in the cotton rat. Three groups of 10 rats were used and received single doses intraperitoneally of different amounts of the three drugs. They were then exposed to the bite of infected mites above, with 10 untreated controls. The infection were allowed to run their natural course and examinations were made at intervals for microfilariae and adult worms. Protection was not afforded by antrypol or stilbamidine. Rats receiving MSb were examined at intervals over a period of 4 to 9 months after exposure to infection for the presence of adult worms since no microfilariae were detected. It was found that a dose of 250 mgm. of the drug per kilo. of weight was an effective prophylactic for a period of three weeks. (See abstract below.)

J. D. FLEMING

BROOKS T. J., J. WARD J. W. & HOLLIS, T. M. Studies on the Incidence of Trichinosis in Mississippi. Preliminary Report. *Am J Trop Med* 1948, Nov. v 28, No 6 854-6. 17 refs.

"(1) Diaphragms obtained from fifty negro cadavers in the Department of Anatomy at the University of Mississippi School of Medicine have been examined by the digestion and compression techniques for the presence of the larvae of *Trichinella spiralis*.

"(2) Three of the fifty diaphragms examined or 6 per cent were found to harbor the parasite.

"(3) Difficulties encountered in this kind both clinical and post mortem diagnosis are commented upon.

"(4) It is anticipated that this series will be enlarged as more specimens become available from time to time.

BROWN M., CHRYSE H., DENNEY F. G. JR., J. E. GILSON, J. L. & H. TUNNEY, E. A. Note on Trichinosis in Animals of the Canadian Northwest Territories. *Canada J Pub Health* 194 Jan 40 v 1 72-3.

OLIVER-GONZÁLEZ, J & BUFDDING, E Reduction in the Number of Adult *Trichinella spiralis* in Rats after Treatment with Naphthoquinones *Proc Soc Exper Biol & Med* 1948, Dec, v 69, No 3, 569-71

"The oral administration of 2-methyl-1, 4-naphthoquinone and 2-hydroxy-3-piperidinomethyl-1, 4-naphthoquinone to rats infected with *Trichinella spiralis* produced a significant reduction in the number of intestinal adult trichinellae. Nine other structurally related naphthoquinones had no such effect."

DEFICIENCY DISEASES

YI, Chien-lung, CHAO, H, CHOW, Yen-chiao & LIU, Yun-moy **Total Serum Protein Level in Normal Adult Chinese** *Chinese Med J* 1948, Sept, v 66, No 9, 477-82 [24 refs]

"1 The total serum protein concentrations of 1,954 normal adult male and 109 normal adult female Chinese were studied

"2 It was found that the total serum protein level is within the normal range in merchants, medical personnel and most of the college students, but there was a slight hypoproteinemia in the majority of the soldiers, policemen, the servants in institutions and civil government employees

"3 The serum protein level was found to vary with the quality of the diet. A diet containing more proteins seemed to increase the total serum protein concentration."

HAEMATOLOGY

DACIE, J V & WHITE, J C Erythropoiesis with particular reference to its Study by Biopsy of Human Bone Marrow: a Review *J Clin Path* 1949, Feb v 2 No 1 1-32 58 figs (34 coloured) on 5 pls & 5 text figs [Numerous refs]

BIGGS, Rosemary & MACMILLAN, R L The Errors of some Haematological Methods as they are used in a Routine Laboratory *J Clin Path* 1948, Nov, v 1, No 5, 269-87, 14 figs [30 refs]

It has been usual for the standard of precision of a method to be based on the observations of a single expert in the particular technique, in the circumstances the error that is exhibited has often little relation to the error that might be expected from the laboratory worker of ordinary skill doing routine examinations. The authors have endeavoured to estimate the error of the method and range of "normal" readings that may be expected from a working laboratory, in carrying out the following procedures—the red cell count, the packed cell volume, the reticulocyte percentage, the haemoglobin percentage, the Price-Jones curve, the platelet count, the red cell fragility, and the whole blood coagulation time.

The results have been treated statistically and are shown in numerous tables. Some of the ranges ($\pm 2 \times$ standard deviation) are shown below—

Haemoglobin	87-107% (Haldane) 91-103% (neutral grey)
Red cell count	3.56-5.22 millions
Haematocrit	44.7-46.3 (Wintrobe)

Mean cell diameter	{ 6.58-7.50 μ (100) or 500 cell measured on one slide) 6.88-7.22 μ (500 cells on 5 slides by 3 observers)
Reticulocyte percentage	1.7-10.8 (dry) 1.0-17.4 (coverdip)
Platelets	{ 63-687 thousands (Dameshek) 134-358 (Lempert)
Coagulation time	{ 4.35-5.25 min. (Lee & White) 1.04-1.09 (Dale & Laskow)
The ranges of some of the calculated indices are —	
Colour Index	0.87-1.36 (Haldane) & 0.90-1.34 (neutral grey)
M.C.H.C	29.26-34.67 & 29.5-33.4
M.C.V	84.4-104.8 cu. μ

The authors remark in the discussion that "It may well be thought that the large errors obtained, in most cases larger than any previously recorded are proof that none but those highly skilled can carry out these investigations adequately. To some extent this is true for many of the techniques can be used with far greater precision. The Haldane method for haemoglobin estimation for example a notoriously unreliable method in routine practice can give very uniform results in the hand of one observer. And in the summary they note that "In the diagnosis of anaemia the most precise measurements found in this investigation were haemoglobin determination using oxyhaemoglobin and a neutral grey photometer the haematocrit, the mean corpuscular haemoglobin concentration and the mean cell diameter derived from the Price-Jones curve

"The red cell count has an error of 9 per cent and thus the colour index and mean corpuscular volume are too variable to record the small differences of interest to the clinician. The routine use of these indices might be restricted to the study of macrocytic anaemia in laboratories where a Price-Jones apparatus is not available

L. E. N. Japer

BIGGS, Rosemary & MACMILLAN R. L. The Error of the Red Cell Count.
J. Clin. Path. 1948, Nov. v. 1. N. 5 284-91 11 refs.

Experiment were designed to find the origin of an irreconcilable discrepancy between the opinions of two groups of workers on the degree of difference allowable between the counts made in different squares of the haemocytometer. Wintrobe and others claim that if the counts differ by more than 18 cell it is an indication that the mixing of the red cell was imperfect and they consider that such count should be discarded. Other workers have claimed that a greater difference between counts in different squares is inevitable since the red cells in a haemocytometer are subject to the Poisson distribution and that a difference up to 40 cells is possible without necessarily indicating an error of technique.

The experiment showed that there was on the part of technician a bias in favour of uniformity in replicate count. This false uniformity did not tend to increase but rather to decrease accuracy.

The authors concluded that (1) in training workers to make routine red cell counts they should not be encouraged to achieve agreement between replicate counts but to make accurate count. (2) in making red cell count a difference up to 40 cells should be allowable between the count in the 8 separate squares counted and (3) the standard error of red-cell count lies between 8 and 10 per cent.

L. E. N. Japer

ROBERTS, J I **Normal Haematological Standards for Nairobi, Kenya**
J Trop Med & Hyg 1948, Dec, v 51, No 12, 254-9

Total blood counts were performed on 200 healthy male European adults, drawn from military units, who had been resident in Nairobi, Kenya Colony, for at least three months. The ages of these men ranged between 20 and 30 years. Nairobi lies practically on the Equator at an altitude of about 5,500 feet. The climate is temperate, the humidity is low, the rainfall being on an average 32 inches per annum and there is a daily range of temperature as much as 30° to 40°F.

The haemoglobin was estimated with a Hellige acid-haematin haemometer (17 gm of oxyhaemoglobin in 100 cc = 100 per cent haemoglobin). The average value for these men was 20.06 gm per cent. The average red cell count was 6,039,000 per cmm, and the white cells were 7,600 (49 per cent polymorphs, 42 per cent lymphocytes). A small group of men were studied from their arrival at Mombasa, on the coast, until a month after residence in Nairobi. There was only a very slight rise in the red cell and haemoglobin values during this period. In other words, the effects of altitude are not felt for a month or longer. The well-marked absolute and relative increase in lymphocytes has been noted before at high altitudes and in the tropics generally, and is thought to be due to the greater amount of ultra-violet radiation.

The author truly states that much remains to be done in the investigation of life at high altitudes, it is still quite uncertain how far (a) altitude, and (b) the sun's rays at the Equator affect the general physiology of man, including his mental state.

P C C Garnham

See also p 432, ROBERTS, A **Comparison of Haematological Results in Europeans and Africans suffering from Active Malaria**

PASSMORE, R. **Severe Anaemia in Indian Sepoys (Refractory Tropical Macrocytic Anaemia)** *Trans Roy Soc Trop Med & Hyg* 1949, Jan, v 42, No 4, 367-80 [12 refs]

"An account is given of 127 cases of severe anaemia with haemoglobin levels below 4.0 grammes occurring amongst Indian sepoys evacuated from the Burma campaign.

"The majority had had recent malarial infections, and just under half presented evidence of a defective nutrition. Ancylostomiasis was not frequent.

"A variety of haematological types occurred, but the majority were macrocytic anaemias.

"Many of the patients differed from cases of tropical macrocytic anaemia as usually described in that they were refractory and did not respond to either yeast or parental liver therapy. Repeated blood transfusions were found to be the most important therapeutic agent."

There were 48 deaths (38 per cent) in the series.

[The paper is mainly of value from a negative point of view, that is to say the author has shown that the anaemias encountered did not fall into any recognized groups, were of uncertain aetiology, and did not respond to recognized forms of treatment. He concludes with a suggestion that is little more than a guess and is certainly not a legitimate deduction from the data presented. It is, however, quoted below because the reviewer believes there is much truth in it.]

"Both the clinical and epidemiological evidence would suggest that we must look back into the past, before the beginning of the war, for the ultimate origin of these anaemias. It is probable that certain sepoys entered the Burma

campaign with a defence mechanism less well equipped than normal to withstand the haematological strains imposed by a period of defective rationing and a simultaneous malarial infection. In the great majority of both British and Indian men at risk the bone marrow reacted vigorously and as soon as the extra strain was removed, the blood was returned to normal. In this small minority the marrow appeared unable to react adequately and a long period ensued of impaired function often terminating in physiological failure sometimes with complete aplasia. This inadequacy of the bone marrow might be the result of repeated previous strain in childhood and youth, probably either from long standing nutritional defect or repeated malarial infections. *L. E. Napier*

SINGER K. ROBIN S. KING J. C. & JEFFERSON R. N. The Life Span of the Sickle Cell and the Pathogenesis of Sick Cell Anemia. *J. Lab. & Clin. Med.* 1948, Aug. v. 33 No. 8 873-84 3 figs. (23 refs.)

In a study of the pathogenesis of sickle-cell anaemia, the author carried out cross transfers of red cells between healthy person with the sickling trait and patients with sickle-cell anaemia. The fate of the transferred cells was followed by agglutination test. Their identity was ensured by transferring O cell to AB recipients or cells containing the A agglutinin to M or MN recipients. The survival times are shown in graphs.

The cell from healthy persons with the sickling trait when transferred into patients with sickle-cell anaemia had disappeared at the end of an average period of 120 days (the generally accepted normal life span of the red cell) graphs showing the percentage survival during the period are linear.

When cells from a patient with sickle-cell anaemia were transferred to a healthy person with the sickling trait the last surviving cell had disappeared after an average period of 74 days (actually 19, 30 & 58 days).

From this the authors conclude that the pathogenic principle operating in sickle-cell anaemia resides within the red cell themselves and that no extra corporeal mechanism can be held responsible for the haemolytic syndrome.

They also conclude that —

1. Trait cell can be used safely for therapeutic transfusion.

2. An analysis of the known facts about the sickling phenomenon shows that the sickling process which is the expression of an abnormality of the stroma does not lend itself to a satisfactory explanation of the pathogenesis of the anaemia. The hypothesis is formulated that sickle-cell anaemia develops because of an additional alteration in the cyto-skeleton which qualitatively different from the structural anomaly responsible for the sickling phenomenon.

L. E. Napier

DALAND Geneva A. & CASTLE W. B. A Simple and Rapid Method for Demonstrating Sickling of the Red Blood Cells: the Use of Reducing Agents. *J. Lab. & Clin. Med.* 1948 Sept. v. 33 No. 9 1062-8 13 refs.

The phenomenon of sickling is dependent upon the concentration of reduced haemoglobin in the blood, and appears when the tension of oxygen in the gas phase with which the blood is in equilibrium is below 40 to 45 mm. Hg. Practically all methods of demonstration, the presence of the sickling phenomenon depend on the production of reduced haemoglobin by restoring the oxygen directly by exhaustion or replacement or by excluding oxygen while the haemoglobin is reduced by metabolic processes.

The authors have devised a simple method in which the haemoglobin is reduced by a chemical agent.

"A drop of a five-fold aqueous dilution of Cevalin (approximating a 2 per cent solution of buffered ascorbic acid, also containing 0.11 per cent sodium bisulphite), or a drop of 2 per cent sodium bisulphite, $\text{Na}_2\text{S}_2\text{O}_5$, is added to a small drop of the patient's blood on a glass microscope slide. After mixing, a cover slip is dropped on the preparation and excess blood is expressed by gentle pressure in order to produce a film of blood sufficiently thin to permit inspection of individual red cells under the high-power dry objective of the microscope. With the diluted Cevalin solution, sickling of the blood usually appeared within an hour, and with the 2 per cent bisulphite solution it was often present within fifteen minutes at room temperature."

In 80 experiments, sickling was observed within 15 minutes in 9 instances, within one hour in 60, within two hours in 77, and within $3\frac{1}{2}$ hours in every instance, when the ascorbic acid solution was used.

The authors also note that formalin, but not by virtue of its reducing properties, fixes the blood in whichever stage it comes in contact with it, that is either sickled or unsickled. Zenker's fluid, however, causes a reversal to the discoid forms when it comes in contact with sickled blood. This fact is of importance when treating tissues with these fluids: the former should always be used where sickling is to be demonstrated histologically. *L. E. Napier*

VENOMS AND ANTIVENENES

GOYAL, R. K. Standardization of Dabofa and Cobra Antivenines. *Trans Roy Soc Trop Med & Hyg* 1949, Jan, v 42, No 4, 381-92

"Widely divergent amounts of test venoms are neutralized by the same amounts of their corresponding antivenines, when the mixtures are injected into different animals by different routes or in the same animal by different routes.

"There is no definite proportion between the quantity of antivenine and the amount of venom neutralized at different levels of test.

"Different batches of cobra and dabofa venoms differ appreciably in potency. It is therefore inadvisable to indicate the titre of an antivenine in terms of mg of venom neutralized. It should be stated in terms of the number of CLDs neutralized.

"A suitable method of titration of cobra and dabofa antivenines has been described."

SERGEANT, Et. De l'utilisation du DDT contre les scorpions. [DDT for dealing with Scorpions]. *Arch Inst Pasteur d'Algérie* 1948, Dec, v 26, No 4, 397-401

The author has carried out two series of experiments, one with a 20 per cent emulsion of DDT, the other with a powder containing 5 per cent DDT.

I. *Trials with Neocidol Emulsion*—A preliminary experiment [the purpose of which is not quite clear] was carried out in which 10 specimens of *Prionurus australis* (the most dangerous of the North-African scorpions) were plunged for 5 minutes in the emulsion of DDT, 10 others being submerged in tapwater for the same time. All the former died in 24 hours, all the latter survived. Next 8 were immersed for one second in the emulsion and 7 of them were dead in 3-4 days.

Trial was then made to find out whether transitory contact with the emulsion, as the passing through it to enter dwellings, would be effectual. The emulsion was sprayed on the bottom and sides of a bowl (*bocal*), and two days later

8 scorpions were placed in it—one only died and that in 3 days. Hence spraying of the ground and walls with such a suspension would afford no protection.

II *Trials with Veculol powder control*—*per cent DDT*—Two cages similar in every respect were used and each had two cartons with folded edges to offer shelter for the scorpion and the floor was sanded. Thirty scorpions were placed in each cage—those in one were sprinkled with the powder the other served as controls. The former at first appeared excited, but in half an hour settled quietly. Then toxic symptoms were observed—tremor and convulsive movements—lowering of the tail pincers open—and they died, one in 2 hours 4 more during the first day 8 on the second, and altogether 22 in the first 8 days—the other lived longer one for 41 day but by then all were dead. Of the control 3 had died in the 41 day—the average loss among scorpions kept in captivity without food.

Lastly 12 scorpion 10 adult and 2 young ones were placed in a similar cage and the powder was dusted once only at the base of the shelter and the "shelters" 13 other (10 adults 3 young) were placed in a similar but undusted cage as controls. The former showed no aversion to the DDT though their ventral surfaces came in contact with the powder. Two were dead in 2 day and 9 in 9 days—the others died on the 13th, 16th and 29th days.

The conclusion is that DDT can be used with success against *P. striatus* if a strati provided the drug is in the powder form. This scorpion is nocturnal in its movement into dwellings from without and it crawl up walls and along wooden surfaces so the powder should be spread between its haunt and bed and bedroom.

II H. H. Scott

DERMATOLOGY AND FUNGUS DISEASES

BRICENO ROSA, A. L. Caratoma del Pinta. Caratoma de Pinta. *Rev. Latinoamericana Clinica y Labor.* Caracas 1948, Mar & Nov. 15 Nov. 25 26 & 27/28 255-77 291 2. [Ref. in footnote.]

The first and greater part of this contribution consists of a general description of *mal del pinto*. The paper was read at a medical congress in Mexico City in December 1947. The important part from the point of view of reader of this *Bulletin* is that which describes the differences between Venezuelan and Mexican pinta on the one hand and the Cuban form on the other. In the latter acromi is fairly frequent and palmar and plantar hyperkeratosis, and dermatitis as to how much of the Cuban pinta is really yaws or bejel, or even just syphilis and whether the Mexican (or Venezuelan) and the Cuban pintas are merely different types of the same disease. The question is left undecided.

II H. H. Scott

HAUSEMAN, R. Over Mycetoma Pedis (Madura Foot). A Case of Madura Foot. *Med. Maandblad Batawa* 1949 Jan 1 v. 2, No 1 8-8 4 fig. on pl.

The English summary appended to the paper is as follows:—

"Description of a case of mycetoma pedis (Madura foot) from the island of Lombok."

SALVI, S. R. & HORTER, C. A. Factors Influencing Haptoglobin Formation. *J. Biol. Chem.* 1949 Nov. 56 N. 3 541-6 1 fig. 11 ref.

By means of a complement fixation test (which preliminary studies showed to be more satisfactory than the usual skin test) the conditions influencing haptoglobin formation by *H. stylus* & *H. salinus* were investigated.

In a medium consisting of *L*-asparagine, 14 gm, glucose, 10 gm, glycerol, 25 gm, magnesium sulphate ($MgSO_4 \cdot 7H_2O$), 1.5 gm, dipotassium phosphate (K_2HPO_4), 1.31 gm, sodium citrate, 0.9 gm, ferric citrate, 0.3 gm, water to 1 litre, the maximum yield of histoplasmin was obtained after 8-10 weeks at room temperature. Replacement of the glucose by 10 gm of cellobiose, dextrin, starch, or glycogen increased the production of histoplasmin from four to eight times. An initial pH of 7.0-8.0, a surface to volume ratio of near unity, and a temperature of 25°C were found to be optimal for histoplasmin production while light, submerged or surface growth, and strain of the fungus were not critical factors.

G C Ainsworth

EMMONS, C W & ASHBURN, L L. Histoplasmosis in Wild Rats. Occurrence and Histopathology. *Pub Health Rep* Wash 1948, Oct 29 v 63, No 44, 1416-22, 2 figs

In a previous paper, EMMONS, BELL and OLSON [see this *Bulletin*, 1948, v 45, 207] described the discovery of histoplasmosis in 10 wild rats and one mouse. The present report deals with the same group of animals, to which 6 more rats have been added. These 16 rats were among 565 trapped in Loudoun County, Virginia, in an area in which human and canine cases of histoplasmosis had occurred. In all cases the diagnosis of the infection in the rats was based on the isolation of *Histoplasma capsulatum* from the spleen and liver and less frequently from the lungs. Macroscopic lesions were seen in only four of the animals, but all of these were not attributable to histoplasmosis. Microscopically, the characteristic lesion of histoplasmosis was an "epithelioid" cell granuloma with a few macrophages and fibroblasts and rarely a giant cell. These granulomata, which occurred chiefly in the spleen, liver, lung and adrenal, were sharply defined and measured from 30 to 200 μ in diameter. *H. capsulatum* was seen in sections from the lesions of nine of the animals.

J T Duncan

SMITH, C E, BRARD, R R & SAITO, Margaret T. Pathogenesis of Coccidioidomycosis with special reference to Pulmonary Cavitation. *Ann Intern Med* 1948, Oct, v 29, No 4, 623-55, 5 figs [44 refs]

This is an important paper which should be read in the original.

In reviewing the pathological features of coccidioidomycosis, the authors state, in relation to the grave but relatively uncommon disseminated granulomatous form of the disease, that "Army experience also has indicated that dissemination usually occurs soon after the infection is acquired, frequently within a matter of weeks and infrequently after months". This is in marked disagreement with the view expressed by FORBUS and BASTEBREURTJE (*Military Surgeon* 1946 v 99 653), that disseminated coccidioidal granuloma is a reinfection phenomenon which may develop at any time up to about ten years after the original infection.

Pulmonary cavitation was found in from 2 per cent to 8 per cent of different series of cases of clinical coccidioidomycosis in the U.S. Army and about 90 per cent of the cavities were single. Cavitation may develop in pneumonic patches within the first few weeks of the illness or up to some months after infection, and in more than half the cases it gave rise to no observed symptoms but was only discovered in the course of routine radiography. The cavities tend to close spontaneously and in the early stages, complete rest until the general symptoms have subsided hastens the healing processes, but a cavity may sometimes persist and if it causes symptoms may require treatment by phrenic crush or even a more drastic surgical procedure. Cavitation is not caused by a progressive local coccidioidal lesion, in fact, it is usually associated

with a demonstrable degree of acquired immunity and it may be accepted as a good prognostic sign for the authors. We have never seen dissemination occur in a patient with coccidioidal cavitation.

J. T. Duran

RECTOR L. E. & RECTOR Eleanor J. Coccidioidomycosis in the Salivary Gland of the Townsend Mole. *Am. J. Trop. Med.* 1943 Sept., v. 23 No. 5 707-9 2 figs.

Two Townsend moles (*Scapanus townsendi*) were caught and killed in the Gamblers District of Seattle Washington State in 1934. The salivary glands were removed, fixed in 95 per cent. alcohol and examined for intranuclear or cytoplasmic inclusions. No inclusion bodies were found but aggregations of fungal cells were seen in the parenchyma of the gland. These fungal cells were spherical and measured on an average 15.3 to 17.1 μ in diameter the limit being 12.3 and 20.5 μ . Budding forms were not seen and there is no reference to endospores. Two competent pathologists appear to have identified the fungus as *Coccidioides immitis* but this diagnosis is difficult to reconcile with the authors' description of the parasite and the photomicrographs of the gland section. It seems significant also that although 15 years have elapsed since this apparent discovery, no further record of coccidioidal infection in the north western United States has appeared. Another fungal parasite of desert rodents *Haplosporangium parvum* which might be mistaken for *C. immitis* has a much wider geographical distribution and has been found as far north as Alberta Canada.

J. T. Duran

MUENDE I. Treatment of Fungus Diseases of the Skin. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1943 Nov. v. 4, No. 3 216-22.

This paper should be read in the original by all who are interested in the control of ringworm infection.

Despite the great amount of research on the chemotherapy of the dermatophytoses and the very numerous fungicides available it must be admitted that the drug treatment of some forms of tinea capitis and tinea pedis is frequently unsatisfactory. In the main treatment tends to be based more on physical than on chemical methods, the epilation of the nail and the use of keratolytic agents play a major part in therapy. Dr. Muende gives timely warning against the use in certain forms of athlete's foot, of irritant or excessively stimulating fungicides even those of recent introduction, because of the danger of causing sensitization or bacterial dermatitis. However stimulating drugs such as chrysarobin and the much advertised phenyl mercury compounds are valuable in the treatment of chronic and resistant infections. The propionate and undecylenates from which much good was expected in cases requiring prolonged treatment have proved rather disappointing.

On the important question of the need for X-ray epilation in the treatment of tinea capitis Dr. Muende points to the good results obtained by topical application of mild chrysarobin ointment followed by mechanical epilation of the loosened hairs when the infecting species is *Microsporum* and he refers to the recent success claimed by Braun and others in the treatment of *Microsporum audouinii* infection of the scalp by the application of phenyl mercuric nitrate in a carbonyl base.

For established onychomycosis a solution of the nail plate combined with the application of fungicides to the nail bed will be the treatment of choice. The temporary avulsion however frequently followed by recurrence of the disease in the new nail and permanent avulsion of the finger nail is aesthetically

objectionable. Further research should be made on the use of fungicidal natural antibiotics, and another line of research recommended is on the use of fluorescent dyes which, when fixed by the fungus, render it highly susceptible to the action of ultraviolet rays, but dyes which fluoresce to the more penetrating rays of the red end of the spectrum may be even more valuable.

For the prevention of tinea capitis, diagnosed cases should be isolated and treated and all contacts should be kept under observation, with repeated examinations, for 2 or 3 weeks to detect carriers and new infections. The control of the more widespread tinea pedis is impracticable except in the case of more or less closed communities.

J T Duncan

HEAT STROKE AND ALLIED CONDITIONS

GALVÃO, P E Human Heat Production in relation to Body Weight and Body Surface I Inapplicability of the Surface Law on Lean Men of the Tropical Zone *J Applied Physiol* 1948 Nov v 1, No 5, 385-94, 2 figs [11 refs]

GALVÃO, P E Human Heat Production in relation to Body Weight and Body Surface II Inapplicability of the Surface Law on Well Proportioned Men of the Tropical Zone *J Applied Physiol* 1948 Nov v 1 No 5, 395-401, 2 figs

CROWDEN, G P A Survey of Physiological Studies of Mental and Physical Work in Hot and Humid Environments *Trans Roy Soc Trop Med & Hyg* 1949, Jan, v 42, No 4, 325-35, 2 figs [20 refs] Discussion 336-40 [WEINER, J S, McROBERT, G, ALAKIJA, O B, TIDY, H, WATTS, J C]

In this very interesting paper the author gives a review of physiological and psychological studies of the effects of work in hot places. Starting with the early observations of BLAGDEN and FORDYCE (1774) he attempts an appreciation of the work of various researchers. Much work on reactions to heat and humidity has been carried out with the purpose of helping men to face difficult climatic conditions in times of war, and the primary object of this paper is to interpret the knowledge so gained so that its use may contribute to human welfare in times of peace.

Much of the more recent work deals with the physiological or mental efficiency of carefully selected subjects, physically fit and young. Crowden very pertinently points out that these subjects were in an optimum condition of health, and had a maximum capacity to withstand fatigue, and that in attempting to apply the experimental result to the general population this very important fact must be borne in mind. He feels that the observations should be carried further to ascertain the reactions of a representative selection of a normal population.

After the presentation of the paper there was an interesting discussion. Sir George McROBERT made biting comment on the way in which English officials in the tropics bedeck themselves with the habiliments of England and, worse, their attempts to induce indigenous inhabitants to follow suit. Dr J S WEINER discussed the effects of air movement and radiant heat, the effects of acclimatization, and tropical anhidrosis.

Replying to the discussion, the author referred to the reduction in air movement within a mosquito net, and the consequent increase in effective temperature, and to the need for further studies of tropical clothing. Thomas Bedford

MISCELLANEOUS DISEASES

MACKAY D. *Cancerum Oris among African Natives. Memoranda. Brit Med J* 1919 Feb 5 223.

The prognosis of this condition has been regarded as almost hopeless. An infection with spirochaetes and fusiform bacilli is considered to be the probable cause.

The author did not see a single case while working in Great Britain in a highly industrialized area, but in the Serengeti district of Northern Rhodesia he met with six cases in three years three of these being fatal. Of the two patients who recovered one was treated by extensive resection of the gangrenous area followed by plastic repair the other with penicillin and this case is reported in detail.

A girl aged about two years was admitted to hospital on Oct 3 1917 clinical examination showing a typical early case of cancerum oris. The next day the brother (the also aged four was admitted monitored with the same disease and died within 24 hours.

The girl was treated at first by swabbing with a strong solution of potassium permanganate but the ulceration progressed. On Oct 10 treatment with penicillin was begun, 10,000 units in aqueous solution being given intramuscularly every three hours. After the third injection, treatment was stopped for twelve hours owing to superstitious objections by the parents. Injections were then resumed and continued until 500,000 unit had been given. Improvement was shown after 24 hours and after three days all signs of infiltration of the surrounding tissues had disappeared and the ulcer showed a clean and healing surface. Recovery was uninterrupted and the patient was discharged on Oct 27. It seems probable that the male child infected the female.

In none of the cases was there a previous history of specific illness and the author thinks that the chief cause is the poor diet and unhygienic life of the African. It may be noted that the probable causal organisms of cancerum oris are similar to those found in tropical ulcer which is very common in the district. C. F. Skellern

HAN T N. Recidiverende zweer aan vulva en vagina gepaard met stomatitis aphthosa en conjunctivitis catarrhalis (syndroom van Behcet) bij een Chinese vrouw. Behcet's Syndrome in a Chinese Woman. *Med Maandblad Batafa* 1949 Jan. I v. 7 No. 1 13 17 "7 refs.]

The English summary appended to the paper is as follows —

"A 44 years old Chinese woman suffered within a year of 10 attacks of aphthous ulcerations situated on the oral mucosa and associated with multiple sharp-edged ulcers of vulva and vagina, and a slight form of conjunctivitis catarrhalis with photophobia. The lesions appeared simultaneously or alternately at intervals of 4 to 6 weeks.

Differential diagnosis between ulcus molle REITER's triple syndrome amoebiasis STEVEN'S-JOHNSON'S syndrome and BIRKET'S syndrome is discussed. According to the author his case is identical with BIRKET. Owing to the fact that the pathogenesis still remains obscure it is interesting not that patient husband is suffering from lung tuberculosis, that her blood globulin rate is too low (0.9%) and that she shows gastro-intestinal disturbances (horlogrignu and roctus) and anaemia.

GREEN R. & MANJESKAR D S. Abscess Cases of Meliodosis. *Brit Med J* 1949 Feb. 19 388-11 2 refs.

The authors describe a case of meliodosis in an Indian artisan in which the only manifestation was a suppurating cervical gland. Complicated resolution

followed treatment by aspiration of the pus and a course of sulphapyridine by the mouth. Other workers have described similar cases in which there was no fever or other constitutional sign, the infection being confined to a solitary abscess or to superficial skin lesions.

The present authors studied the sensitivity of a strain of *Pf whitmori* to various sulphonamides *in vitro* with results in favour of sulphathiazole and sulphadiazine. The organism is not sensitive to penicillin in concentrations attainable in the blood, this antibiotic has been advised for local treatment. With the use of the ring-cup technique, streptomycin and polymyxin in concentrations up to 1,400 μ gm per ml failed to inhibit the growth of *Pf whitmori*. Chloromycetin, however, in concentrations attainable in the blood (60 μ gm per ml) gave a high degree of inhibition.

The conclusion is that chloromycetin, alone or in combination with sulphonamides, is worthy of clinical trial in melioidosis. J C Cruickshank

KAO Yung-en Incidence of various Diseases among Children in Kweichow
Chinese Med J Shanghai 1948 Sept, v 66 No 9 487-93

ENTOMOLOGY AND INSECTICIDES GENERAL

TAKEI, H Distribution and Epidemiological Significance of *Aedes aegypti* in
Kainanto *Kitasato Arch Exper Med* 1942, Aug, v 19, No 2, 110-13

DURAND-DELACRE R Quelques observations biologiques sur les phlébotomes de
Beni Ounif-de-Figuig (Sahara oranais) [Some Biological Observations on
Phlebotomus in Beni Ounif-de-Figuig (Oran Sahara)] *Arch Inst Pasteur
d'Algérie* 1948 Dec, v 26 No 4 406-30 6 figs [10 refs]

HOFFMANN, Anita Breve nota acerca de los ectoparasitos de ratas colectadas
en los mercados del Distrito Federal [A Short Note on Ectoparasites of
Rats collected in Market Places in Mexico City] *Rev Inst Salubridad y
Enfermedades Trop Mexico* 1948, June, v 9, No 2, 81-5

The English summary appended to the paper is as follows —

"The author presents a brief note concerning the ectoparasites of 100 rats, collected in some of the market places of Mexico City, in June 1948. The specimens correspond to the following common species of mites *Liponyssus bacoti*, *Echinolaelaps echidninus*, of lice *Polyplax spinulosa*, and of fleas *Xenopsylla cheopis*, *Ctenocephalides felis*, *Ctenocephalides canis*, *Leptopsylla segnis* and *Echinophaga gallinacea*."

PARROT L & DURAND-DELACRE, R Notes sur les phlébotomes LX Quelques
remarques sur les phlébotomes des terriers de rongeurs du Sud oranais
[Notes on *Phlebotomus* LX *Phlebotomus* in the Burrows of Rodents in the
Area South of Oran] *Arch Inst Pasteur d'Algérie* 1948, Dec, v 26, No 4,
402-5 [10 refs]

FULLER H S Some Remarks on the Trombiculinae Ewing, 1929, in Das
Tierreich, Trombididae, by Sig Thor and Willmann A Critical Review
Reprinted from *Bull Brooklyn Entom Soc* 1948, Oct, v 43 No 4 101-11

MINISTRY OF HEALTH. Memorandum on Measures for the Control of Mosquito Nuisances in Great Britain. Memo. 238/Med. Revised Nov 1948. 35 pp. 2 maps & 2 pls. 1949 London H.M. Stationery Office [U]

This memorandum was first published in 1940 and revised and reprinted in 1942 [this *Bull* n 1943 v 40 413]. The present revision retains practically all the subject matter of the earlier editions. A few deletions have been made in the section on Control: this has been modified and brought up to date by the inclusion of information on the use of DDT and BHC ("Gammaxene") against mosquito adults and larvae and on the use of dimethyl phthalate as a repellent.

The memorandum mentions that only a few cases (number not stated) of indigenous malaria occurred in the British Isles immediately after the second world war [but see this *Bull* n 1948 v 45 21]. D S Hertram

DAHL, A. H. New Plans for Vector Control in California. *J. National Malaria Soc.* 1948 Sept v 7 No. 3 231-5.

The diseases carried by arthropods which occur in California are encephalitis, fly-borne diseases, malaria, plague, Q fever, relapsing fever, Rocky Mountain spotted fever, tularemia, and typhus fever. A new department known as the Bureau of Vector Control has been established to organize the prevention of these diseases. Its first action was to review the importance of each, the state of fundamental knowledge of the vector and the reservoir and the sufficiency of past surveys, control programmes and control demonstrations. The result of this review is set out in a table from which it is clear that work could be better balanced, and proposals are made for the increase of some items of work such as survey of encephalitis, fly-borne diseases, Q fever, relapsing fever, Rocky Mountain spotted fever and typhus and for the decrease of others such as survey of plague and tularemia.

The future policy of the Bureau will be guided in this analysis of the problem, and by an advisory committee. It will have a staff of 40 persons including sanitary engineers, entomologists, sanitarians, and rodent control staff in addition to the entomologists from the Federal agency already in the State. G. Macdonald

ANDREWS, J. M. Control of Diseases propagated by Arthropod Vectors. *Bol. Oficina Sanitaria Panamericana.* 1948 Nov v 77 No 11 948-1007 [10 refs.]

In an opening address to the Pan American Sanitary Conference of 1949 the author briefly reviews the prospects of securing efficient control of 141 forty diseases carried by arthropods. He concludes that battling world conflicts especially those in which the end would seem to justify such ruthless means as a biological war is never reason to believe that the present trend of arthropod-borne diseases should continue downwards. Some of these diseases seem to be susceptible to eradication technology certainly within the more advanced countries of the world. G. Macdonald

GARAY, J. B., GILBERT, I. H., FREELY, R. I. & WILSON, H. G. Comparative Toxicity of Four Chlorinated Organic Compounds to Mosquitoes, House Flies, and Cockroaches. *J. Economic Entomol.* 1949 Oct 41 No 5 793-801

The authors describe tests comparing the effectiveness of DDT, benzene hexachloride, chlordane and chlorinated camphene both in space sprays (1

LABORATORY PROCEDURES

SUTER R. Action des produits mouillants sur la coloration des parasites sanguicoles. (Note préliminaire) [The Use of Wetting Agents in the Staining of Blood Parasites.] *Ann Parasit Humaine et Comp* 1948, v 23 Nos 3/4 220-21

Swiss work had previously shown that thiodan blue was an ideal and rapid stain for certain blood parasites (trypanosomes, spirochaetes and leptospires) (see SUTER in this Bulletin 1947 v 44 628). The stain is composed of methylene blue and saponin which form a stable combination. The saponin haemolyzes the red cells and thus makes it easy to detect the organisms even when very few are present. Under ordinary illumination the parasites stain blue but under the dark ground, the curious Berek effect is produced and the organisms exhibit an intense and brilliant red colour.

The author discovered that saponin could be replaced by many other wetting agents as long as they possessed a haemolytic action. Two were found which acted nearly as well as saponin—Desogene (a quaternary ammonium compound) and Eriopon (an amide prepared by Geigy). P C C Graham

GOLDMAN M. A Single Solution Iro-Heamaterylin Stain for Intestinal Protozoa. *Stn Technology* 1949 Jan., v 24 No 1 57-57

Two solutions are prepared —

Solution A—A 1 per cent. solution of hematerylin in 95 per cent alcohol prepared by diluting a 10 per cent. stock solution of the dye in 95 per cent alcohol. Ripening is unnecessary.

Solution B—Ferric ammonium sulphate 4 gm. glacial acetic acid 1 cc., concentrated sulphuric acid (sp gr 1.8) 0.12 cc. in 100 cc. of distilled water.

Equal part of freshly prepared solutions of A and B are mixed and kept for a few hours and filtered before use. The mixture should be discarded if it becomes greenish black in colour instead of dark brown.

Faecal films are fixed in Schaudinn's solution plus 5 per cent acetic acid, for 1 hour, washed in 70 per cent. spirit plus iodine for 5 minutes and then in 2 changes of 50 per cent. spirit for 3 minutes each. The stain is applied for 3 minutes and washed off in tap water for 5-30 minutes. The film is finally dehydrated, cleared and mounted.

Intestinal protozoa are stained blue or grey and show the usual features brought out by the Heidenhain technique though with less precision. The method is recommended for routine diagnostic purposes. P C C Graham

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. Report of the British Guiana and British Honduras Settlement Commission. Cmd 7333. (Eva S. Geoffrey (Chairman).) pp. viii+359 10 maps (9 in pocket and 1 in text) & 31 at figs 1948 London H M Stationery Office 7 6d

The public health as well as the social and economic structure of the West Indian island, reflect the difficulties caused by excess of population, the density of which varies from 1,200 to the square mile in Barbados to little below 300 in Jamaica and Trinidad. In contrast the enormous territories of British Guiana and British Honduras are virtually unpopulated, with densities 1.4 and 7 per square mile respectively. In each of these last two there is a small, densely populated area with a vacant hinterland isolated by natural barriers of difficult country which has prevented free access.

There have been many suggestions for the use of these vacant lands, and this Commission was instructed to report on the possibilities of settlement in them "having regard to the recommendations made by the West Indian Conference in 1944 and 1946 regarding the need for study of the Guianas and British Honduras as an aid to the solution of the problem of over-population in the West Indian island territories." The report makes it clear that there is no insuperable barrier to settlement. Medical problems are examined in detail. An analysis of the history of British Guiana shows that until recently the death rate exceeded the birth rate and the population was only maintained by regular immigration, though some doubt is thrown on the normally-accepted estimate of the extent of the natural decrease. In recent years a natural increase has replaced the decrease and it is reliably estimated that the population will increase by 40 per cent in the next 15 years. Malaria, once the greatest cause of mortality, is no longer so, and there is no other serious endemic disease which cannot be brought under reasonable control either in the coastal lands or in the interior. An able analysis of the effect of the climate on Europeans shows that there is no reason why they should not live and work there in what is called sporadic or dependent settlement, as technical advisers and administrators but close or independent settlement by them is not advisable.

The Commission considered the two alternatives of encouraging the independent settlement of smallholders and of large-scale commercial plantations without considering any intermediate type such as co-operative farming on an economic scale. The decision is in favour of encouraging agrarian settlement for the production of export crops on a plantation, not a smallholding, basis, immigration being timed to meet the needs of the various projects. Most immigrants would arrive as contract employees of individual concerns, the large employer so far as possible providing housing and social services, though Government would care for smallholders in this way.

The many difficulties are reviewed and it is concluded that it should be possible over a period of some ten years for the two Colonies to absorb about 100,000 men, women and children, including about 25,000 adult workers. Such migration would have to begin slowly and extend over many years and would lead, it is hoped, to a "chain reaction" of economic progress in the economy of the two Colonies which would continue to absorb immigrants.

[The reviewer cannot avoid the feeling that the Commission has overlooked the instruction to consider the matter as an aid to the solution of the island population problem. Though the health, economics and population of these two Colonies are closely studied there is no factual matter besides a brief introductory note on the relation between the rate of increase in the population in the islands and the absorptive capacity of the new countries. Details are given of the proposed Development Corporations and of the intentions for agricultural development, but the estimate of the number who could be absorbed is baldly stated in the introduction without any supporting data in the text on the rate of migration or the manner in which the total has been estimated. It may be that the Commission considers that immigration would only start on any material scale in the last couple of years of the decennium, and a rapid increase might be expected thereafter. Perhaps the figures given refer to direct employees and their dependents only and the total would be swollen by an equal number engaged in trade, transport, ancillary services and the professions. Perhaps a plantation area is considered only as a nucleus for the growth of those services needed by a farming community which would appear around them. But on these points and similar relevant ones the Commission throws no light. The question whether settlement in the interior is possible is adequately answered in the affirmative. The question whether such settlement could have any material effect on the population problems of the islands is left unanswered.]

G Macdonald

FORD J & HALL R. de Z. The History of Karagwe (Bakoba District)
Tanganyika Notes & Record 1947 Dec. No. 71 77 pp 1 map
 [29 refs.]

The authors are interested in the history and especially in the early epidemics of a part of Bukoba a district in Tanganyika lying along the south-west corner of Lake Victoria.

Bukoba is inhabited by two very different tribes. The Bahima who are aristocratic pastoral people Nilotic in origin and the Banyambo who are agricultural people and Bantu. In the latter part of last century there was a long period of serious raking wars and disturbances, aggravated by European penetration though the authors state that German occupation was not seriously harmful to the social organization of the country. At the same time there was a serious uncontrolled epidemic of smallpox which was apparently a disease new to the country and chiggers (*Trombidium*) arrived from West Africa. The people did not understand how to deal with the chigger many men were crippled and in some places harvest were lost because the people were suffering from chigger ulcers and could not get the crops in.

The country had been prosperous for grass was good and there were plenty of good cattle. In 1890 or 1891 there was an immense epidemic of rinderpest with terrible destruction of the cattle. The Bahima were compelled to fall back on the crops produced by their agricultural neighbours and dependents. They lost their social position by doing so but were saved from death by starvation. It seems that until the end of last century tsetse flies were absent then *C. morsitans* entered the country apparently from the south and by 1901 had advanced at least seventy miles crossing the border into Ankole where cattle died and trypanosomes were found.

The result of all these disasters was serious loss of population and the people who remained were socially disorganized. As the cattle died the grass country went back to bush and became occupied by tsetse. At present the reduced population is concentrated and the people are somewhat crowded together a menace again to the risk of sleeping sickness. The authors point out that there have been many causes operating to ruin this good land. Among them is the fact that the indigenous society was not well adjusted to meeting its own (a somewhat indefinite diagnosis).

The authors have assembled a large amount of information which is of necessity fragmentary. They seem to have interpreted it in a reasonable way. The result is a refreshing and interesting paper. P. I. B. van

MINISTRY OF SUPPLY & DEPT. SCIENT. & INDUST. RES. Tropical Proofing
 Protection against Deterioration due to Tropical Climates. Compiled by
 the Directorat of Chemical Research and Development pp. 37
 1949 London H.M. Stationery Office 2s.

The work was originated by the Ministry of Supply in the war period. Studies were made on the destruction of military equipment. It mainly refers to insect and fungi and tropical climates. It is on method of protecting equipment or designing it in such a way as to reduce damage. Work on these subjects is still in progress in Nigeria.

The present pamphlet is brief and rather general. It deals with attack by fungi and insects and discusses the particular problems of great variety of materials among them paints, leather, wood, textiles, paper and paint. The special problems produced by optical and electrical instruments are also considered. Damage done to building, ships or other large structures or food stuffs is not included.

The account of fungi covers four pages. The main biological characteristics of the moulds are introduced and attention is directed to conditions of temperature and humidity which are generally most favourable to them. It is pointed out that some moulds may interfere with the performance of optical instruments owing to the presence of their hyphae on the surfaces of lenses or mirrors; others may grow through the insulation of electrical devices or bridge gaps in circuits. Other moulds grow, as is doubtless well known, on organic materials of many types, and some of the species are particularly associated with certain substrates. The section on fungi is concluded by brief and rather general recommendations about the reduction of damage.

It is considered that damage by insects is a relatively minor matter and the whole subject is dealt with in about a page and a half. This seems inadequate for instance it is not possible to deal with the biology of termites and the damage they cause in one paragraph. One observes also that in describing the destruction of woollen materials by beetles there is no reference to the organic insecticides.

A number of other criticisms might perhaps be made. One would expect some reference to the possible toxic action of certain of the fungicides to the men who apply them. We feel also some doubt about a list of timbers which are said to be resistant both to fungi and to termites—it would surely be preferable to distinguish two groups of timbers and if possible to identify them by their scientific names. In the present list each timber is given only a single African or Asiatic name. Parts of the pamphlet appear to have been drafted by someone who experienced great difficulty in expressing his meaning in English, though the sympathetic reader will generally divine what is intended, as in the following example—

“ stores containing rubber parts should, therefore, be given a fair chance and should not be exposed unnecessarily to heat, brilliant sunlight or to other adverse conditions. An interesting, and unexpected, example of this is the formation of high concentrations of sulphuric acid in imperfectly drained hose, due apparently to certain strains of thiophilic bacteria.”

The subject of the pamphlet is without doubt very important. A greatly extended edition of it with a fuller list of references might well be a very valuable work.

P. A. BURTON

IRIARTE, D. R. *Estudios entomologicos y parasitologicos* [Entomological and Parasitological Studies] 253 pp., numerous figs. & 3 coloured folding pls. 1948. Caracas. Tipografia Americana.

This is a collection of articles, most, if not all, of which have been published before and all but two have already received notice in this *Bulletin*. The longest is the first, on the Simuliidae of Venezuela. In this the author reviews the history of the Family and gives an account of their bionomics; one section is given up to the question of their classification and contains a description of the 11 species already found by the author in Venezuela and a useful key for their identification. Six other species have not been found by the author himself, of these he therefore, gives the original descriptions. Line maps indicate the distribution of these species. Finally, there is a fairly comprehensive bibliography on the subject. Other papers, dealing with cutaneous leishmaniasis, Chagas's disease, carate and paracoccidiosis have already been abstracted in this *Bulletin* [1940, v. 37, 105, 1945, v. 42, 655, 1946 v. 43, 1128, *et al*] and need not be again referred to.

H. HAROLD SCOTT

BOOK REVIEWS

SIRRY, George (M.B. B.S. (Srd.) Acting Senior Pathologist, Colonial Medical Service? *Nutritional Macrocytic Anaemia*. 78 pp. 13 pls. (3 coloured & 2 maps) & 16 charts 1947. London: Crown Agent for the Colonies 4 Millbank, S.W. 1. [£1 1s. 0d. Rs. 14.]

This volume bears the date 1947 and was received for review in December 1948 but it is only fair to the prospective reader and to the author to say that it contains intrinsic evidence of having been a very long time in the press—for example there is only one reference dated 1943 and none with a later date and the words "follic acid" were not encountered.

With the limitations naturally associated with the above facts, the book constitutes a useful but of course far from complete summary on nutritional macrocytic anaemia and gives some indication of the type of case that is encountered in Mauritius. However if this information had been condensed into a paper of 3 000 to 5 000 words and published in a medical journal at the end of 1943 or early in 1944 it would have constituted an up-to-date and far more useful contribution to the literature on this subject.

The condition is common in Mauritius and most common in the highly malarious coastal belt but no general survey has been done. The author found macrocytes in 20.3 per cent of 300 blood slides taken from children.

The staple diet of members of the labouring classes (from among whom all the cases came) is parboiled rice 485 grammes daily with pulses (40 grammes) bread (67 grammes) and fruit and vegetables when they are in season and cheap. They consume about 16 grammes of fat mostly vegetable in origin. Meat is eaten rarely less than once a week, and fish "occasionally" but milk is drunk regularly. It is stated that this is usually diluted but there is no indication of the average amount taken. The common vitamin deficiencies are A and B groups.

Splenomegaly was found in 75.9 per cent of the cases and the usual cause was malaria. The van den Bergh reaction was 1.0 norm or over in 22.9 per cent and 0.5 norm in 51.1 per cent of cases of the former group 90 per cent of patients had enlarged spleens.

Malaria appears to exert its destructive influence partly by direct parasitization of the red cells partly by a toxic effect on the bone marrow but mainly by hypertrophy of the reticulo-endothelial system, which then attack the abnormal erythrocytes. This statement is not based on his reported experience.

While the disease in its severe form does appear to be definitely more common in females particularly during pregnancy there is no evidence that there is any particular age or sex distribution of mild or moderately severe nutritional macrocytic anaemia. Thus, in Mauritius macrocytosis and mild clinical anaemia was found commonly in children under 10 years and the male:female ratio was approximately 1:1.

"Eighty per cent of the local cases were Hindus but the percentage of Hindus in the population group is not here stated elsewhere it is noted that "the labourers" are mostly Hindus.

The months of highest incidence of severe anaemia are June, July and August whereas the malaria season (from February to May). The author thinks that the former disease is dependent on the latter.

The pathology of the disease is discussed from the literature or new data are supplied.

The clinical picture is described. It is not always clear whether the author is giving his own experience or quoting from the literature. In his cases

abdominal pain is common (50 per cent) and vomiting less frequent (25 per cent) Wasting is unusual Tachycardia is usual but not hypotension Nervous symptoms are few and there was never any cord involvement

Some mean blood findings in the cases were as follows —

Haemoglobin, grammes per cent — 4.08 (1.41 to 12.85)
 Red cells, per cmm — 1,129,000 (lowest 375,000)
 Mean corpuscular haemoglobin — 37.35
 Mean corpuscular—haemoglobin concentration—28.8 per cent
 Mean corpuscular volume 134.7 cu μ
 Mean corpuscular thickness—4 of 10 above 2.5 μ
 Mean corpuscular fragility (non-pregnant cases)—0.349 NaCl
 Leucocytes per cmm — 4,530
 Platelets per cmm — 77,038 (17,850–154,840)

In the sternal puncture smear the author found normoblasts and megaloblasts the latter were of about the same average size as those found in pernicious anaemia [and larger than other workers have reported in nutritional macrocytic anaemia] The ratio of red/white precursors was about 1/1

The Price-Jones curve shows a shift to the right in most cases

The three curves illustrated show a higher peak and narrower base than is typical of pernicious anaemia

The mortality rate was approximately 18 per cent, late application for treatment was the main cause of this high mortality The author devotes a chapter (or rather a part) to treatment, but again it is difficult to follow what he himself actually used in his cases, except that in six (4 males and 2 non-pregnant females) he used a locally prepared yeast mixture, a by-product of a local sugar factory These six cases are reported in detail and, in 4, graphs of the blood counts are given all showed rapid and satisfactory improvement [However, the treatment of pregnant women constitutes a much more difficult problem] The author refers to whole liver, liver extracts, and Marmite, but not to proteolysed liver or folic acid He also mentions blood transfusion, but not apparently from personal experience in this disease

There are three short appendices on Mauritius, with a map, on technique, in which he notes the methods he used and a table of the blood findings in his fifty cases

The book is generally speaking well produced and contains a number of illustrations, including two good coloured plates of megaloblasts, but it is not entirely free from printing (or clerical) errors e.g., there is a reference to WILLS and MAWSON which should obviously be MILLS and MAWSON, and Machanda, Manchanda, and Manchunda, are variants used to indicate one worker

L E Napier

MATHIS, C [Membre correspondant de l'Académie de Médecine, etc] & PONS, R [Ancien Chef de Laboratoire à l'Institut Pasteur de Saïgon, etc]
 Manuel de Pathologie Exotique [Manual of Tropical Diseases] pp viii+642, 10 figs & 1 coloured pl 1948 Paris Presses Universitaires de France, 108 Boulevard Saint-Germain [35s 6d]

This book is intended primarily for the use and guidance of medical practitioners in the Tropics It covers the whole range of diseases commonly dealt with in text-books of tropical medicine In every chapter attention is mainly concentrated on clinical signs and symptoms, diagnosis and treatment Descriptions of laboratory techniques essential to the diagnosis of so many tropical diseases are confined to those which the average practitioner should be capable of carrying out himself Preventive measures receive but scant attention Notes concerning the geographic distribution of diseases relate almost entirely to French overseas possessions

The book is clearly and concisely written and very well produced. It is evidently based on wide personal experience but the authors claim that their manual takes account of recent advances in knowledge of the aetiology and treatment of tropical diseases can hardly be substantiated. Omissions are very numerous—for example new methods of malaria therapy receive bare mention and the yellow fever chapter is very inadequate.

Rapidity of progress in the domain of tropical medicine has been so great during the last ten years that the difficulties attendant upon the production of an up-to-date manual are almost insurmountable. The major part of this volume would appear to have been written several years ago. Very considerable additions would be necessary for the adequate discharge of the authors' self-imposed task.

Norman Halse

KUCZYNSKI R. R. *Demographic Survey of the British Colonial Empire. Vol. I. West Africa.* pp. xi + 821. Issued under the auspices of the Royal Institute of International Affairs. 1948. London, New York, Toronto. Geoffrey Cumberlege, Oxford University Press. [73s.]

The first volume of this Survey deals with West Africa. It is packed with wealth of statistical and other documentary detail attractively presented and constructed throughout against a historical perspective.

The book is introduced with six sections dealing with the fundamentals, namely Census-taking, Total Population, Composition of Native Population, Composition of Non-Native Population, Birth and Death Registration, Native Fertility, Mortality and Population Growth, and Mortality of Europeans.

This sequence is followed in each of the main chapters, which deal respectively with Sierra Leone, Gambia, Gold Coast and Togoland, and Nigeria and the Cameroons.

Of special interest to medical reader will be the large amount of material dealt with under the arduous heading of mortality, which concerns the common infective and other diseases of the Tropics. The greater part of this material is taken from Annual Medical Reports of the Colonies and from similar sources but its assembly against this background gives it a new appeal. The Survey contains an immense amount of information which will be of value and interest to those who are concerned with West Africa and its welfare.

H. J. O. D. Huiskes

TROPICAL DISEASES
BULLETIN

Vol 46]

1949

[No 6

SUMMARY OF RECENT ABSTRACTS*

V LEISHMANIASIS

VISCERAL LEISHMANIASIS

Epidemiology Aetiology Transmission

GIRAUD *et al* (p 984) review the incidence of kala azar in the Marseilles area, where 238 cases have been seen since 1923. It is found chiefly in children under 3 or 4 years of age, and the disease is also common in dogs. The authors suggest that transmission may be from dog to child by ticks rather than by sandflies, but this view is supported only by indirect evidence. RANQUE *et al* (p 883) also make the point that canine leishmaniasis is still found around Marseilles, and stress that early diagnosis can be made by gland puncture, before the formol reaction or the clinical features are diagnostic. Leishmaniae were found by DE AZEVEDO *et al* (p 985) in 6.5 per cent of 137 dogs examined in Lisbon. LUENGO ARROYO *et al* (p 163) report that infantile kala azar occurred in 13 provinces of Spain in 1946, they think that the squirrel may be a reservoir host, as well as the dog. BALLABRIGA (p 316) mentions 40 cases of infantile kala azar treated in Barcelona in three years.

BOSSELUT (p 775) describes disseminated leishmaniasis in a cat in Algiers, it has rarely been recorded before. The species of leishmania found is not named.

Kala azar is recorded from Sardinia (DORE, p 418), Palermo (MONDINI, p 418) and the Tuscan Archipelago (GUIDERI, p 418). BURGIO (p 507) reports an increase in the number of cases of infantile kala azar seen in Palermo in 1944-45.

SEN GUPTA (p 881) traces the history of kala azar in Calcutta since the special clinic was instituted in 1921. One part of the city is a highly endemic area. The number of cases seen rose above the general level in 1923-25 and again from 1944 to 1947, and the author thinks that the latter exacerbation was the result of the famine of 1943, and the presence of susceptible children born since the earlier epidemic wave. He thinks that the virulence of the parasite has been increased by passage through this enfeebled population. HEILIG and SACHDEV (p 246) suspect that kala azar may occur in Jaipur, India, which is outside the usually recognized endemic area. They admit that the diagnoses on which this suspicion is based are not conclusive.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948, v 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

The book is clearly and concisely written and very well produced. It is evidently based on wide personal experience but the authors claim that their manual takes count of recent advances in knowledge of the aetiology and treatment of tropical diseases can hardly be substantiated. One non-artery numerous for example new methods of malaria therapy need a bare mention and the yellow fever chapter is very inadequate.

Rapidity of progress in the domain of tropical medicine has been so great during the last ten years that the difficulties attendant upon the production of an up-to-date manual are almost insurmountable. The major part of this volume would appear to have been written several years ago. Very considerable additions would be necessary for the adequate discharge of the authors' self-imposed task.

Norman White

KUCZAKSKI R. R. *Demographic Survey of the British Colonial Empire. Vol. 1. West Africa.* pp. xvi + 821. Issued under the auspices of the Royal Institute of International Affairs. 1948. London, New York, Toronto. Geoffrey Cumberlege, Oxford University Press. [75s.]

The first volume of this Survey deals with West Africa. It is packed with wealth of statistical and other documentary detail attractively presented and constructed throughout against a historical perspective.

The book is introduced with seven sections dealing with the fundamental namely Census-taking, Total Population, Composition of Native Population, Composition of Non-Native Population, Birth and Death Registration, Native Fertility, Mortality and Population Growth, and Mortality of Europeans.

This sequence is followed in each of the main chapters which deal respectively with Sierra Leone, Gambia, Gold Coast and Togoland, and Nigeria and the Cameroons.

Of special interest to medical readers will be the large amount of material dealt with under the various headings of mortality which concern the common infective and other diseases of the Tropics. The greater part of this material is taken from Annual Medical Reports of the Colonies and from similar sources but its assembly against this background gives it renewed appeal. The Survey contains an immense amount of information which will be of value and interest to those who are concerned with West Africa and its welfare.

H. J. O. D. B. de-Graffney

endothelial cells tend to disappear, and the normal elements to increase RACHMILEWITZ *et al* (p 984) think that the cause of the anaemia of kala azar is increased destruction of red cells

The electrocardiogram shows no valid evidence of change characteristic of kala azar in children, GIVA and BINAGHI (p 1074) think that such changes as occur indicate myocardial affection due to a toxic factor or to the anaemia

SEN GUPTA *et al* (p 882) report 4 cases of pneumococcal meningitis in patients with kala azar

Treatment

ADAMS and SEATON (p 246) have treated 6 patients with kala azar by an intensive course of intravenous sodium antimonyl tartrate, lasting for only two days. The results were not so good as those obtained with stibosan, urea stibamine or the diamidines, but the course may have advantages if a longer period of treatment is not possible. In a communication relating to this paper, NAPIER (p 247) refers to the danger in treatment with sodium antimonyl tartrate, and suggests that for intensive treatment the benign pentavalent compounds should be chosen rather than this relatively toxic trivalent salt

AVERSA and CROSCA (p 507) did not find that iron added to the value of antimony in the treatment of infantile kala azar, in relation to the blood picture

CARNEVALE (p 419) found that there was a concomitant syphilitic infection in four cases of infantile kala azar, which resisted treatment with tartar emetic until the syphilis had been treated. Resistance to antimonials should raise the suspicion of syphilis

SWITH *et al* (p 985) have investigated in animals the tissue distribution of radioactive antimony inhaled as stibine

BURCHENAL *et al* (p 319) record a case of kala azar in which treatment with many antimonial and other drugs was ineffectual, and the patient was eventually cured by splenectomy. After this operation there was rapid improvement in the blood picture and in symptoms, the spleen was very large and contained a large infarct. The authors discuss the subject and the points which should be borne in mind when splenectomy is contemplated

ADLER *et al* (p 774) think that the Sudan strain of *L. donovani* behaves like *L. infantum* in response to treatment and should probably be classed as *L. infantum*. They found that propamidine and pentamidine have significantly less action *in vitro* on the flagellates of *L. infantum* than on those of *L. donovani*, but that the effect of stilbamidine is the same on both, though less than that of the other two compounds. In comment, however, LOURIE points out that when measured by a different technique the effect of stilbamidine is much the same as that of the other two drugs against flagellates of *L. donovani*, and suggests that this technique should be used to compare the response to stilbamidine of flagellates of *L. donovani* and *L. infantum*. The LD bodies were more sensitive than flagellates to each compound

COLLARD and HARGREAVES (p 320) report that in 22 of 24 patients in whom they used stilbamidine for the treatment of Mediterranean kala azar, there occurred late evidence of neuropathy which was serious. The symptoms were anaesthesia, paraesthesia or hyperaesthesia, usually of the face, scalp and neck, and the skin sometimes became dry and atrophic. No treatment had any effect but the condition remained at its maximum up to 18 months and then gradually improved. In an investigation of the toxic properties of solutions of stilbamidine exposed to sunlight FULTON (p 508) has investigated the constitution of photostilbamidine, the irradiation product of stilbamidine which apparently undergoes dimerization on exposure to sunlight. HENRY (p 775) thinks that the delayed toxic effects observed after administration of

FELTON and JOYNER (p. 775) show that the cotton rat is susceptible to infection with *L. donovani*. The disease progresses but is not fatal. BOLLEGER and BACKHOUS (p. 883) have transmitted *L. donovani* to the pouch young of 24 Australian possums (*Trichosurus vulpecula*) and one ring tailed possum (*Pseudocheirus lewinsoni*) and describe the lesions produced. It is evident that the first of these marsupials is highly susceptible and may be a suitable animal for investigation of the disease.

HAWKING (p. 503) has succeeded in growing *L. donovani* in tissue culture. SHIH LU CHANG (p. 774) has studied the biochemical activities in culture and respiration of three species of leishmania and *T. cruzi*. For details the original abstract may be consulted.

By agglutination complement fixation and precipitin test SHIH LU CHANG and NEGERSON (p. 590) have shown that culture forms of *L. donovani*, *L. brasiliensis*, *L. tropica* and *Trypanosoma cruzi* possess both species-specific and common antigens. GHOSH and GHOSH (p. 692) have investigated the complement-fixation and agglutination reactions of rabbits immunized with a living culture of *L. donovani*. Titres were high; there is apparently no distinction between H and O antigens.

ROMAN (p. 55) gives a list of *Phlebotomus* species caught in Tunisia. HARRIS and LEWIS (p. 163) note that *Phlebotomus longirostris* var. *orientalis* is the only one of the *P. major* group whose distribution is related to that of kala azar in the Sudan. Its occurrence is erratic and variable and this may have some bearing on the erratic and variable occurrence of kala azar. The authors discuss other species found including *P. papatasi* and they note that cracks in the soil and animal burrows, form a vast mass of subterranean resting places. It is not known whether these are also breeding places.

Tests Clinical Findings

HO *et al.* (p. 694) have compared spleen puncture, sternum puncture and liver puncture as diagnostic procedures in kala azar. Spleen puncture apparently gave the best results, closely followed by sternum puncture and the authors advise that both should be done to ensure accurate diagnosis. Liver puncture is considerably less useful. The pathological appearances in one fatal case of kala azar in which death followed spleen puncture are described by LEWIS (p. 697).

CARNEYALE (p. 507) describes a test in which the speed of penetration of HCl into serum gel (with Congo red) is measured; the speed is slightly increased in kala azar. TRINGLO (p. 695) has observed that when HCl is added to the serum of patients with kala azar, jellyfication takes place.

LEVY and YERGANI (p. 319) describe a case with an incubation period of 17 months.

MOST and LAVITTE (p. 317) describe the signs and symptoms of kala azar as they saw it in 39 American soldiers who contracted the disease in India or in the Mediterranean area. For detail the original abstract may be consulted, but they are not exceptional. In comment VARELA remarks that his impression of this paper is that it demonstrates how very standardized kala azar is in the adult whether acquired in India or the Mediterranean.

GATTO (p. 418) describes the splenogram in infantile kala azar and MORAVO (p. 418) a case in which kala azar seemed to be involved in the aetiology of the Banti syndrome.

CAPTWEI *et al.* (p. 693) discuss their work on the pancytopenia of kala azar as they studied it in China. Anaemia a constant and normochromic orthochromic type. Leucopenia an almost constant feature and platelets are reduced. The bone marrow always hyperplastic and a full description of the cell is given. During effective treatment the para-medullary reticulo-

endothelial cells tend to disappear, and the normal elements to increase RACHMILEWITZ *et al* (p 984) think that the cause of the anaemia of kala azar is increased destruction of red cells

The electrocardiogram shows no valid evidence of change characteristic of kala azar in children, GIVA and BINAGHI (p 1074) think that such changes as occur indicate myocardial affection due to a toxic factor or to the anaemia

SEN GUPTA *et al* (p 882) report 4 cases of pneumococcal meningitis in patients with kala azar

Treatment

ADAMS and SEATON (p 246) have treated 6 patients with kala azar by an intensive course of intravenous sodium antimonyl tartrate, lasting for only two days The results were not so good as those obtained with stibosan, urea stibamine or the diamidines, but the course may have advantages if a longer period of treatment is not possible In a communication relating to this paper, NAPIER (p 247) refers to the danger in treatment with sodium antimonyl tartrate, and suggests that for intensive treatment the benign pentavalent compounds should be chosen rather than this relatively toxic trivalent salt

AVERSA and CROSCA (p 507) did not find that iron added to the value of antimony in the treatment of infantile kala azar, in relation to the blood picture

CARNEVALE (p 419) found that there was a concomitant syphilitic infection in four cases of infantile kala azar, which resisted treatment with tartar emetic until the syphilis had been treated Resistance to antimonials should raise the suspicion of syphilis

SMITH *et al* (p 985) have investigated in animals the tissue distribution of radioactive antimony inhaled as stibine

BURCHENAL *et al* (p 319) record a case of kala azar in which treatment with many antimonial and other drugs was ineffectual, and the patient was eventually cured by splenectomy After this operation there was rapid improvement in the blood picture and in symptoms, the spleen was very large and contained a large infarct The authors discuss the subject and the points which should be borne in mind when splenectomy is contemplated

ADLER *et al* (p 774) think that the Sudan strain of *L. donovani* behaves like *L. infantum* in response to treatment, and should probably be classed as *L. infantum* They found that propamidine and pentamidine have significantly less action *in vitro* on the flagellates of *L. infantum* than on those of *L. donovani*, but that the effect of stilbamidine is the same on both, though less than that of the other two compounds In comment, however, LOURIE points out that when measured by a different technique the effect of stilbamidine is much the same as that of the other two drugs against flagellates of *L. donovani*, and suggests that this technique should be used to compare the response to stilbamidine of flagellates of *L. donovani* and *L. infantum* The LD bodies were more sensitive than flagellates to each compound

COLLARD and HARGREAVES (p 320) report that in 22 of 24 patients in whom they used stilbamidine for the treatment of Mediterranean kala azar, there occurred late evidence of neuropathy, which was serious The symptoms were anaesthesia, paraesthesia or hyperaesthesia, usually of the face, scalp and neck, and the skin sometimes became dry and atrophic No treatment had any effect, but the condition remained at its maximum up to 18 months and then gradually improved In an investigation of the toxic properties of solutions of stilbamidine exposed to sunlight, FULTON (p 508) has investigated the constitution of photostilbamidine, the irradiation product of stilbamidine, which apparently undergoes dimerization on exposure to sunlight HENRY (p 775) thinks that the delayed toxic effects observed after administration of

stilbamidine may be due to the formation of a monoamide in the body. He discusses the changes which may take place when stilbamidine is exposed to light.

The histological changes in chronic poisoning of animals with stilbamidine are recorded by SEAGER and CASTELLINOVO (p 164). There were degenerative changes chiefly in the liver and kidneys.

HARTON (p. 56) shows that stilbamidine is excreted largely in the form of a non fluorescent compound, since fluorimetric methods detect in the urine only one twentieth of the amount detected by colorimetric methods.

CUTANEOUS AND MUCO-CUTANEOUS LEISHMANIASIS

KATZENELLENBOGEN (p. 55) reports a new endemic form of oriental sore (of the dry type) in southern Palestine.

ANSARI (p. 184) has succeeded in infecting white mice by injection of culture forms of *L. tropica*. Intradermal, intraperitoneal and intratesticular injections were successful, but the last were most constantly so though there were refractory mice in each group. A local granuloma is formed, which eventually gives rise to systemic infection with lesion resembling those of kala azar.

Snow *et al.* (p. 695) note that cutaneous leishmaniasis is uncommon in the Panama Canal Zone and they report on 12 cases seen in the Gorgas Hospital since 1937. The lesions were all on exposed parts of the body and presented as ulcers with multiple small subcutaneous nodules along the regional lymphatics. Leishmaniasis was found in biopsy material from the ulcers. Treatment with various antimonials was successful.

GOLDMAN (p. 47) discusses the classification of American cutaneous leishmaniasis of which the special feature is involvement of mucous membranes either by direct extension from a cutaneous lesion or by metastasis. Clinical and parasitological diagnoses are always difficult—casual scraping of the lesion is useless.

MANGABEIRA-ALFENAZ (p. 321) describes in detail various forms of leishmanial nasal nodule as it occurs in American mucocutaneous leishmaniasis.

GUIMARÃES (p. 508) records (for the first time) that local infection (on the nose) of a hamster with *L. t. ashmeadi* led to a generalized spread of the infection.

PRASOŁ and ROTBERG (p. 694) report favourably on an intense short course of tartar emetic in the treatment of American cutaneous leishmaniasis.

HERRIG and FAIRCHILD (p. 834) used DDT as a residual spray in the control of sandflies in Peru, with success. They sprayed houses, cañitas in dry stone walls, etc., and rarely found sandflies in the sprayed places until several months later. The method seems to be successful in preventing the spread of leishmaniasis and bartonellosis.

MUNIZ and MEDINA (p. 776) describe a new species of *Leishmania* pathogenic for the guinea pig and TORRES *et al.* (p. 778) give an account of the lesions it provokes.

MALARIA

BOSCARDI, F & CORSI, C Considerazioni epidemiologiche sui malarici di una collettività di profughi in Roma, provenienti dalle provincie diverse del Lazio, negli anni 1945-1946 [Epidemiological Data concerning Malaria among a Group of Refugees in Rome coming from Various Provinces of Latium in 1945-1946] *Ann d'Igiene* 1948, Jan-Feb, v 58, No 1, 13-22, 4 figs & 1 map

In 1945 many thousands of refugees arrived in Rome fleeing from battle areas Of 7,225 that were under observation 3,551 came from one or other of the five provinces of Latium Of the latter, 408 were suffering from malaria, some of the sufferers coming from districts which had been free from endemic malaria till the destruction of war had caused a remarkable extension of infected territory Of 1,266 refugees from Latina 28.5 per cent were infected, of 406 from Frosinone 7.14 per cent., and of 1,848 from the Province of Rome 0.97 per cent There was no malaria among the small number of refugees coming from the Provinces of Rieti and Viterbo The intensely malarious area was confined to the whole of the Province of Latina, a small adjacent part of the Province of Rome and the southern third of the Province of Frosinone

Norman White

DELBOVE, P & CAPPONI, M Impaludation et prémunition en milieu cambodgien [Malaria Infestation and Premunition of Cambodians] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 474-8

Malaria has afflicted Cambodia since ancient times To it has been ascribed the disappearance of the Mon-Khmer civilization Today malaria is severely endemic or hyperendemic throughout the country, with the exception of areas bordering on the Mekong River and the Great Lakes Nevertheless the adult Cambodian is generally a robust person, capable of really hard manual labour, and appears to suffer little or nothing from his malaria infection But the observations recorded in this paper indicate that the Cambodian's noteworthy tolerance of malaria is not due to a state of premunition properly so called Spleen rates and parasite rates of adults are not very much lower than those of children and they are subject to well-marked seasonal variation In the rainy season, these rates approximate those that one would expect among a population devoid of premunition in a highly malarious region In the long dry season there is a marked reduction in the parasite rate, most marked among adults, but the spleen rates persist at a high level It would seem that exposure to infection throughout the year is necessary to the development of premunition such as is acquired by the Moïs in the high plateaux of Southern Indochina

Norman White

NETO, J C de M F, TÔRRES, A L & PINTO, G F Estudo epidemiológico sobre a malária na localidade no Imbuí (Município de Niterói, Estado do Rio de Janeiro) e plano para o saneamento da região [Epidemiological Study of Malaria in Imbuí (Niterói District, State of Rio de Janeiro) with a Plan for the Sanitation of the Area] *Rev Hig e Saúde Pública* 1947, Oct-Dec, v 5, No 3, 1-38, 6 graphs & 23 figs

Imbuí lies 12 kilometres south of the city of Rio de Janeiro The area surveyed contains a civil population of 693 living in primitive conditions, mostly fisher folk Malaria and malnutrition are rife, tuberculosis is very prevalent There is also a Fort with a garrison strength of some 125 to 155, which is changed annually In 1945 there were 50 cases of malaria in the

garrison, and 68 cases in 1948. *P. m.* infections were most common; *P. malariae* was rare. The most prevalent anopheline was *A. farinivittatus*, the chief vector; a lagoon was the chief breeding place. *A. bellator* also occurs. bromeliads are plentiful in the district. Control measures include the construction of a dyke from the sea to a large lagoon; the resulting increase of salinity of the lagoon water should prohibit mosquito breeding.

Norman White

GORDON R. M. & CREWE W. The Mechanisms by which Mosquitoes and Tsetse-Flies obtain their Blood-Meal, the Histology of the Lesions produced, and the Subsequent Reactions of the Mammalian Host together with some Observations on the Feeding of *Cixius* and *Cimex*. *Ann Trop Med & Parasit* 1945, Dec. v. 42, Nos. 3-4 334-58 2 graphs, 9 text figs. & 14 figs. on 4 pls. [44 refs.]

This study is not primarily concerned with clinical aspects of insect bites; it deals chiefly from a parasitological viewpoint with the local trauma and reactions at the site of the bite since it is the authors' opinion that these may be found to play an important, possibly essential, part in the transmission and subsequent development of certain insect-borne infections.

The paper is divided into Part I concerned with the bites of mosquitoes (*Aedes aegypti*, *Anopheles maculipennis* and *Culex molestus*) and Part II dealing with tsetse fly bites (*Glossina palpalis* or *G. morsitans*). Some notes are included on the bites of *Cixius* and *Cimex*.

Part I—The methods by which *Aedes aegypti* obtains blood from its host were described by GORDON and LUNDEN (this Bulletin 1940 v. 37 633) who showed that the tsetse is capable of distal flexure after deep insertion. It is capable of either penetrating a capillary, curving along its course and drawing blood directly from it or alternatively one or more capillaries are lacerated with a resultant haemorrhage into the inter-capillary spaces from which the mosquito then feeds ("pool-feeding"). Salivary secretion is injected into the tissues at intervals during the process of biting.

In non-sensitized animals and presumably in non-sensitized human beings, the only immediate effect of the bites of *Aedes aegypti* is the occurrence of slight haemorrhages. These persist for at least twenty-four hours. Agglutination of red blood corpuscles occurred only in bites of *A. maculipennis* which is known to contain an agglutinin in its salivary secretion (this Bulletin 1934 v. 21 783).

It is recognized (HICHT *Rev. Sanit. Assint. Soc. Caracas* 1943 8 391 and MELLANBY this Bulletin 1947 v. 44 740) that reaction to mosquito bites may consist of an immediate local reaction and a delayed papular reaction. The immediate reaction is often severe and attracts attention; the delayed reaction is generally less apparent and is frequently overlooked.

The immediate local reaction fails to appear in persons not previously bitten by a particular species of mosquito but after repeated irregular exposure to its bite a state of allergy is developed and the local reaction appears during or immediately after bite. This allergic response persists unless the host is exposed to regular and frequent bites in which case the reaction diminishes progressively in duration and intensity until the host is desensitized and ceases to react. Sensitization can be avoided if a person not previously bitten by a particular species of mosquito is exposed regularly and frequently to it. For example, no reaction occurred in a person exposed almost daily for 185 days to two or three *Aedes aegypti* bites. The causative substance is shown to exist in the salivary secretion of the mosquito. Sensitivity is highly specific; a person about equally sensitive to two species of mosquito was desensitized

to one (*Aedes aegypti*) and retained sensitivity to the other (*Culex molestus*). In the event of a person ceasing to be exposed regularly to bites the state of desensitization may be lost and the reaction reappear.

The *delayed papular reaction* appears within about twenty-four hours after the first exposure, or first few exposures, of a person unsensitized to the bite of *Aedes aegypti*. It may then persist for about 160 hours. Over a period of time its onset comes earlier and its duration and intensity are diminished. Loss of this reaction follows both regular and irregular exposure to bites. Its causation is attributed by the authors to a slow-acting toxin injected with the mosquito's salivary secretion and not to sensitization as in the case of the immediate reaction. The localised swelling of the delayed reaction is histologically shown to be due to the separation of collagen fibres by extravasated fluid from the lacerated capillaries, small haemorrhages are attributed to the action of the mouthparts at the time of biting.

It is suggested that the "immunity" of indigenous persons in the tropics to mosquito bites is not a racial characteristic but is due to their exposure to constant bites from birth.

Part II—The proboscis of the tsetse fly is capable, like that of the mosquito of distal flexure. Feeding from intercapillary haemorrhages ("pool-feeding") is considered to be the usual source of blood of the feeding fly. Such a haemorrhage increases during the first twenty-four hours, except in the case of bites by flies from which the salivary glands have been removed, and part of the blood may sink among the underlying muscle fibres, the blood is invaded—mostly by histiocytes—after forty-eight hours and, after seventy-two hours, the tissue is again normal. This uncomplicated resolution of the haemorrhage occurs in non-sensitized persons in whom, furthermore, no visible reaction can be detected on the occasion of their first, or first few, bites from tsetse fly. On the other hand in sensitized persons—and this state can be attained after as few as four or five bites—there is, presumably owing to leakage of fluid from damaged capillaries, extensive separation of collagen fibres and dilatation of vessels to form a weal. Severe swelling of adjacent parts occurs in highly sensitive persons. Removal of the fly's glands prevents the appearance of the weal in sensitive persons and it is, therefore, concluded that the substance responsible for the reaction is in the salivary secretion. It is probable, from general evidence, that desensitization follows continuous regular exposure to bites and that although sensitization is not localized, desensitization is most marked in the bitten area. This seems to apply both to tsetse and mosquito bites. The authors find no evidence in tsetse fly bites of a delayed action nor of the slow toxic poison which they consider to be responsible for it in mosquito bites.

Chrysops and *Cimex* bites also give rise to a subcutaneous haemorrhage and, in *Cimex*, distal flexure of the mouthparts in the skin is demonstrated. It seems then that "pool feeding" is a frequent event in blood-sucking insects, it is probably the rule in tsetse fly feeding, but capillary feeding is thought to be more usual in mosquitoes.

This paper is, in addition to its original matter a comprehensive collation and discussion of a widely scattered literature on the subject of insect bites, the interpretation of the host-reactions, the use of antigen for desensitization and the effects of drugs on bites. In this last connexion the anti-histamine drug benadryl, at 150 mgm daily for three days gave no appreciable change in the appearance of the immediate reaction in two persons highly sensitive to *Aedes aegypti* but the itching sensation was markedly diminished. There was however, some indication that a general reaction which follows injection of large amounts of salivary antigen into a highly sensitive person is reduced by the drug.

The plates consist of one photograph of the proboscis of a tsetse fly penetrating skin (skin section at $\times 200$) and 13 photographs of skin sectioned at different intervals after insect bites.

D S Bertram

SEFULORI P & MESSA, A. Ciclo gonotrofico delle anofeline ibernanti in provincia di Venezia. [Gonotrophic Cycle of Anophelines hibernating in the Province of Venice.] *Riv di Malariologia*. 1948, Aug. v 27 No. 4 139-50 1 map.

The English summary appended to the paper is as follows —

The authors have observed that hibernation of *A. maculipennis* starts in the province of Venice at the end of October and continues during November. It is nearly complete by December and lasts the whole month of January. At the beginning of hibernation (November) the dissociation and gonotrophic disharmony may possibly explain primary malaria infections. The danger does not exist in December and January.

During the month of February *Anopheles* becomes active again and start their gonotrophic activity which in March is extended to 95% of the captured adults.

FARID M A. A Preliminary Note on an Unusual Breeding Place of *Anopheles gambiae* in Egypt. *J Roy Egyptian Med. Ass.* 1943 Apr., v 28 No. 4 123-8 2 figs.

After noting the measures taken to eradicate *Anopheles gambiae* from Egypt, the author records the finding of the larvae of this mosquito among the floating mats of the water plant *Potamogeton* in the river Nile. One such mat was 3-10 metres from the shore 5-7 metres wide and 500 metres long. Another mat was in water so deep that it could be reached only by boat. The necessity for the destruction of these *Potamogeton* mats is stressed, because pieces break off and float down the river taking the larvae with them.

H S Larson

MAURITIUS COLONY OF. Annual Report on the Medical and Health Department 1947 [RANKINE A., Director]. 48 pp. 1949 Port Louis J. E. Ed. Felix Govt. Printer [60 cents.]

In this Report (which will be reviewed separately) it is noted that during the course of a mosquito survey of the Savanne District of Mauritius in 1947 a specimen of *Anopheles maculipes* was found in November in the village of St. Martin. This is the first record of the finding of this species in Mauritius. It is added that a few days later in the same village another mosquito new to the island was discovered — this was a species of *Mansonioides*.

H J O'D Burke-Gaffney

LEESON H S. Anopheline Larvae collected in Arabia. *Am Trop Med & Parasit* 1948 Dec. v 42, Nos. 3-4 253-5 1 map.

A report on anopheline larvae collected in 1944 and in a footnote on anopheline adults taken between January 1947 and February 1948 in Arabia. The larval collections were made in the coastal area from Jubail to Khobar and at Hofuf and in the area of El Kharj about 50 and 200 miles inland, respectively and from parts of the Oman and Trucial Oman area at the entrance to the Persian Gulf. Adult records are restricted to the Jubail-Khobar area and to El Kharj.

In January in the Jubail-Khobar strip larvae of *A. stephensi* the most numerous species were encountered particularly in drain, wells and borrow

pits *A. fluviatilis* larvae occurred in shaded fresh-running water in drainage and irrigation canals and, at Saihat, in brackish wells. Other larvae recorded, in order of frequency, were *A. sergenti*, *pulcherrimus*, *multicolor* and *coustani*.

All these species were also found at Hoffuf in the larval stage with the addition of a few *A. hyrcanus* larvae and one specimen, accepted as *A. cinereus*, but in which it is noted that hair 13 of the ventral prothorax has three branches instead of six or seven as described for this species elsewhere. *A. stephensi* and *A. fluviatilis* larvae were common. No adults from this area are recorded in the 1947-48 collection.

In the El Kharij area, only *A. multicolor* larvae were observed in February despite a careful search for other species, it occurred in drains, irrigation canals, and wells. The adult records consist of *A. multicolor* and *A. stephensi*.

In most of the parts of Oman and Trucil Oman examined in March and April 1944, *A. culicifacies* was the only species found and bred chiefly in freshwater wells. A few larvae of *A. adenensis* and *A. stephensi*, however, were taken in this area. No adults are recorded from this region.

The paper concludes with a key to the fourth stage larvae of the species named above with the addition of *A. turkhudi*, *hispaniola*, *d'thali* and *superpictus* which might be expected to occur in this little known region.

D S Bertram

DE ZULUETA, J & BATES, M. Laboratory Experiments with Selection of Oviposition Site by *Anopheles darlingi*. *Amer J Hyg* 1948, Nov, v 48, No 3, 350-60, 4 figs [11 refs]

A study was made of the behaviour of the ovipositing female *Anopheles darlingi* obtained from a laboratory colony. The experimental methods are described in detail and are illustrated by photographs.

Some of the results reported here may mean that visual orientation is of importance in determining the selection of an oviposition site. There were two peaks of egg-laying activity, one after sundown and one after sunrise. Females usually laid their eggs while hovering a few centimetres above the water surface, though some did so while resting on the water or on the sides of the vessel. Upright obstacles, represented by inverted test tubes or glass rods, standing in the oviposition pans, and other objects which broke the water surface, repelled the mosquitoes, but when tubes or rods were stood around outside the pan they were attractive to them. A pan shaded by cardboard 35 centimetres above the water surface was attractive, but a sheet of glass in the same position had no effect, if the glass was lowered to 15 centimetres the pan was avoided.

These and other results indicate a need for further experiments on these lines with other anopheline species.

H S Leeson

PURI, I M. The Distribution of Anopheline Mosquitoes in India, Pakistan, Ceylon and Burma. Part V. Additional Records, 1936-47. *Indian J Malariology* 1948, Mar-June v 2, Nos 1/2, 67-107 [48 refs]

DI, F J & DEL ROSARIO, F. The Occurrence of *Anopheles minimus flavirostris* (Ludlow) in the City of Manila. Reprinted from *Acta Med Philippina* 1948, Jan-Mar, v 4, No 3, 9 pp, 4 figs & 1 map on 3 pls.

This is the first record of *Anopheles minimus flavirostris** breeding in the city of Manila. It bred in two streams about a hundred yards from a populous area. The possibility that it may transmit malaria within the city is raised,

and the case of a 2-year-old child who may have contracted her infection of *P. falciparum* within the city limits is recorded. It is postulated that heavy losses in animals " (presumably caraboa) during the recent war may have caused a spread of the mosquito in the absence of sufficient animal host barriers or possibly this mosquito was missed in previous surveys.

Other species collected in the city area in the present survey were — *A. maculipes* *kyrcanus* *niger* *kyrcanus* *lestus* *fulvipes* *tricolor* *luteolus* and *s. pictus* *indefinitus*. The collections were made during four days in December and consist mainly of larvae some of which were bred out a few adults of the species marked were taken near the streams.

D S Bertram

Dr F J & Garz R. B. Sporozoites of *Plasmodium* *sp.* in *Anopheles* *margareti* and Oöcysts in *A. kochi*. Reprinted from *Acta Med Philippina*, 1948 Jan-Mar., v 4 No 3 5 pp., 3 figs. on 2 pls.

Following a report that *Anopheles minimus flavirostris* the generally accepted malaria vector in the Philippines was relatively rare in the highly malarious Tabla Valley a search was made for anopheline adults in the vegetation of stream banks. The following species were taken — *A. minimus flavirostris*, *margareti* *kochi* *tricolor* *subpictus* *indefinitus* *negus* *hirsutus* *maculipes* *kyrcanus* *niger* *kyrcanus* and *larbrosus*. Sporozoites were found in the glands of 1 specimen of *A. m. flavirostris* and ? of *m. negus* as oöcysts in 3 of the former in 1 of the latter species and in 1 female of *A. kochi*. The numbers of each of these species dissected was small, viz 54 52 and 15 respectively. From 1 to 8 dissections of the other species were negative.

It is not certain that the *Plasmodium* *sp.* was of human origin but since the species were collected from the same place and included infected *A. minimus flavirostris* the results are presented as presumptive evidence that *A. margareti* is a vector of human malaria in the Philippines.

D S Bertram

WALKER, A. J. The Teaching of Malaria Diagnosis. *Amer J Trop Med* 1948 Nov v 28 No 6 777-85 7 figs. 129 refs.

The author shows considerable disagreement with most previous teachers of malaria as set forth in their published work. Much of the paper is indeed, a criticism of present teaching of the diagnosis of malaria and with much of it many practising malarialogists will not agree. After discussing the well known difficulties for the inexperienced in preparing adequate thin blood preparation the author gives strong arguments in favour of the well made thick film many workers will perhaps wonder why these arguments have been considered necessary.

Among his conclusions the author proposes that well prepared thin blood smears showing representative stages of the parasite should be used solely to demonstrate the general erythrocytic cycle that species diagnosis is best taught by demonstrating the special behaviour of *P. falciparum* in the peripheral blood and thereafter by the manner of differentiation between malarial and non-malarial infections and that material for study should consist of actual thick blood films on the ground that preparations of them do not lend themselves to photography or pictures.

The author makes a number of startling statements the ground for which are difficult to discover. For example on p 778 he suggests explanation for some reason why the writers of otherwise excellent textbooks have not devoted themselves to a consideration of thick film findings or the subject did not lend itself to such treatment. Again on p 781 with reference to

Schüffner's dots, is the disconcerting observation "I have yet to find a student, intern or technician who can demonstrate it in their own preparations"

There are many other points with which an abstracter might disagree not the least of these is the statement at the close of the paper "I request the suppression of too familiar charts and colored plates as being largely responsible for the general inadequacy of the statistics on malaria in this country as well as the hopelessness of the situation of students in regions where malaria exists"

H J O'D Burke-Gaffney

KISSIN, M & ADLEMAN, R J Transient Urticaria in Malaria *Amer J Trop Med* 1948, Nov, v 28, No 6, 797-802. [28 refs]

Five cases of transient urticaria were seen by the authors among 75 cases of malaria which they observed in a general hospital in China. Of the 75 cases, 73 were infected with *P. vivax*, 1 with *P. falciparum*, and 1 was a mixed infection. There was considerable variation in the size of the weals, and the degree of itching present. The rash appeared with the rise in temperature, persisted during the peak, and subsided with defervescence. Only one of the patients gave any history of previous allergic disorder, he had had a single attack of urticaria 12 years previously.

In the authors' experience the first or subsequent rigor might come on without an eruption, but once urticaria appeared as a sign during a bout of malaria, the eruption usually recurred with each temperature rise. The urticaria developed before antimalarial therapy was begun, and could not therefore be ascribed to medication with quinine, quinacrine [mepacrine] or salicylates.

H T H Wilson

CERABONA, M Contributo allo studio del rapporto tra nefrite e malaria [Observations on the Relations between Nephritis and Malaria] *Riv di Malarologia* 1948, Aug, v 27, No 4, 151-8 [20 refs]

The English summary appended to the paper is as follows —

"The author summarizes the various theories on nephritis from malaria and gives his observations made on 1,457 patients. Among these he found 13 patients with heavy and 38 a slight renal dysfunction. He considers that it must be admitted that malaria acts as a direct cause on the pathogenesis of renal alteration, even if one has to bear in mind that a prior renal weakness may exist in these individuals."

RADIAN, I Paludisme et leucémie myéloïde [Malaria and Myeloid Leukaemia] *Riv di Malarologia* 1948 Oct, v 27, No 5, 185-90, 2 figs

The English summary appended to the paper is as follows —

"A malaria patient (T M) with considerable hepatic splenomegaly and a haematological report of the myeloid leukaemia type was cured in two months by a treatment of quinine, primaquin and efedrin intravenous."

"The author discusses the relation between malaria and myeloid leukaemia and he points out the importance of malaria in the affections of the endothelial reticulum and of the bone-marrow."

FERRARI A. A dosagem dos sais de quinina na urina. Seu valor na clinica. Novos e velhos rumos na profilaxia. [Estimation of the Salts of Quinine in the Urine. New and Old Methods at Prophylaxis.] *Brazil-Medico* 1948, Nov 20 & 27 v. 62, Nos. 47/48 404-8.

"A dose of quinine acts more effectively the greater its dilution" because it then more readily penetrates to the capillaries and the reticulo-endothelial system in the organs where the parasites are hidden.

Determination of quinine in the urine is made by the Giemsa iodide-sublimate method. By this, freshly prepared solution of bichloride of mercury (1.8 per cent. in distilled water) is added just before use to an equal quantity of 20 per cent. potassium iodide. The urine is boiled and filtered and the reagent added. A blue disk forms at the junction if quinine is present and the rapidity of its appearance indicates the content of quinine. If within a minute 1/25,000 in two minutes 1/30,000 in three minutes 1/40,000 in five minutes 1/50,000. In a healthy person 0.5 gm. quinine per os will be evidenced in the urine in 15 minutes and elimination goes on for 4 hours. Slow elimination lasting more than 24 hours, is a bad sign, indicating circulatory stasis.

Some persons exhibit an intolerance to quinine and complain of tinnitus and vertigo but a dose of 0.5 gm. with 5 cgm. of extract of *Cinchona racemosa* taken in a capsule at 5 a.m. followed an hour later by a cup of coffee and a stay in bed for two hours proved quite satisfactory in the author's experience. A single dose each morning (for how long?) resulted in disappearance of the parasite. The author concludes that at this hour of the morning sporogony is taking place and the drug acts directly on the parasites in the blood. During the night the rosettes divide up and the schizonts dispersed in the plasma are attacked immediately by the quinine.

In subtertian infection the intravenous route is to be preferred the contents of an ampoule diluted in 100 cc. physiological saline gave admirable results in hospital practice. The collaboration of the reticulo-endothelial system in destruction of the parasites he maintain is facilitated by proper dilution and penetration of the quinine into the capillary network.

II Harold Scott

LEDOX J. CROCMAT H & CROCMAT-CLAUSER, J. Mors Tetanus siderant après injection de quinine. [Fatal Tetanus after a Quinine Injection.] *Bull Acad. Nat. Med.* 1949 v. 133 No. 12, 4-5

Account of a fatal case in a child.

VAKE J. R. Some Pharmacological Actions of Paludrine. *Brit. J. Pharmacol. & Chemotherapy* 1949 Mar v. 4 No. 1 14-16 figs. [31 refs.]

A study of several properties.

MULLICK, K. L. B & GUPTA, J. C. Further Observations on Parenteral Paludrine Hydrochloride in Malarial Fever. *Indian Med. Gaz.* 1948 Oct., v. 83 No. 10 488-9

This is a report of the treatment of 191 patients suffering from malaria with intra-venous injections of paludrine. The patients were employees of the Ludlow Jute Mills, Chengal. The diagnoses were based on clinical symptoms. In this locality 85 per cent. of malaria infection are said to be due to *P. vivax*. Paludrine tablet were dissolved in normal saline solution one tablet 0.1 gm. in 5 ml. After sedimentation the clear supernatant fluid was siphoned off and autoclaved. Twenty ml. (4 tablet) were usually injected some patients received 30 or 35 ml. at an injection. Fever was suppressed in 75 per cent. of

the cases within the 12 hours following the injection. The dose of 20 ml was as effective as higher doses. There were no toxic symptoms. After the patients had become afebrile, tablets were given by mouth to complete a course of 21 tablets in all.

Norman White

CANET, J. Premiers essais de traitement curatif du paludisme aigu en Cochinchine. Par un nouveau médicament synthétique la Nivaquine C ou 3 038 R P [First Trials of a New Synthetic Drug, Nivaquine C or 3,038 R P, in the Treatment of Acute Malaria in Cochinchina] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 527-32

These observations were made in the Quanloi Hospital, Honquan. Twenty patients were treated, 2 Europeans and 18 indigenous agricultural workers who had come originally from Tonking but who had all been long employed on rubber estates in this hyperendemic malarious region. Most of the patients had marked splenic enlargement. All had been admitted to hospital with high fever and parasitaemia, 18 *P. falciparum*, 2 *P. vivax*. The drug was given in tablet form each containing 0.1 gm of the base. Fourteen of the patients received 3 tablets a day, two patients 4 tablets a day, and four 5 tablets a day. Fever ceased in the majority of the cases on the second or third day, parasites disappeared on the third or fourth day. Schizonts of both *P. falciparum* and *P. vivax* were equally susceptible to the action of the drug, but the gametocytes of *P. falciparum* were unaffected. A daily dose of 0.30 gm is adequate and a 5- or 6-day course of treatment is sufficient for an attack of average intensity. No symptoms of drug intolerance were ever noted. Nivaquine C is as effective as quinacrine and appears to act more rapidly. It should be of value for mass prophylaxis [see also this *Bulletin*, 1949, v 46, 15].

Norman White

SOHIER, R, GREGOIRE, J & RANC, A. Traitement du paludisme à *Pl. vivax* par le dichlorhydrate de méthyl 3 (diéthyl amino-pentyl) amino-4-chloro-7-quinoléine (3038 R P ou Nivaquine C) et le sulfate neutre de (diéthyl-amino-pentyl) amino-4-chloro-7-quinoléine (3377 R P ou Nivaquine B) [Treatment of *P. vivax* Malaria with Nivaquine C and Nivaquine B] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 482-5

The 48 patients with *P. vivax* malaria who were treated with either Nivaquine C or B had mostly returned from Indochina where they had suffered from previous attacks. Both drugs were very effective in arresting fever and other symptoms. The dose of 0.5 gm a day for five days was well tolerated. Splenomegaly was notably reduced in 45 per cent of cases during this five-day treatment. Of 21 patients who were kept under observation for periods of from 2 to 7 months 4 relapsed.

Norman White

SCHNEIDER, J & CARUANA, M. Essais de traitement curatif du paludisme par la sulfaméthylidiazine (Sumédine) [Treatment of Malaria with Sulphamethyldiazine] *Bull Soc Path Exot* 1948, v 41, Nos 7/8, 478-81

This reports the treatment of 14 patients suffering from malaria with sulphamethyldiazine. The dose for adults given was generally 3 or 4 gm a day for 4 days or more. In 4 of 6 patients with *P. falciparum* infections satisfactory results were obtained. In 6 of 8 patients with *P. vivax* the treatment was without effect. As an antimalarial drug sulphamethyldiazine is in every way inferior to the usual remedies.

Norman White

ADKLEY A. D. CURD F. H. S. & ROCK, F. L. Synthetic Antimalarials. Part XXXIII. An Alternative Route to N-Aryl-N'-Alkylbiguanides and Related Compounds: the Condensation of Guanidines and Cyaramides. *J. Chem. Soc.* 1949 Jan. 98-106.

GAOR, J. C. Synthetic Antimalarials. Part XXXIV. Physicochemical Studies on the Biguanides. *J. Chem. Soc.* 1949 Jan. 221-6 4 figs.

BENNETT G. M. CROFTS P. C. & HAY D. H. Synthetic Antimalarials. Part XXXV. Further Arylamino-alkylamino-alkylamino-squinoxaline Derivatives. *J. Chem. Soc.* 1949 Jan. 227-32.

MADINAVEITIA J. & RAVENTÓS J. Antimalarial Compounds as Antagonists of Adenosine. *Brit. J. Pharmacol. & Chemotherapy* 1949 Mar. v. 4 No. 1 81-92 4 figs. 76 refs.]

Antimalarial compounds antagonize the action of adenosine on the guinea pig heart and on the hen caecum.

A parallelism between the antimalarial activity and the power to antagonize adenosine has been demonstrated in most series of compounds examined.

In heart lung preparations it has been found that unlike the other antimalarials tested paludrine does not antagonize the action of adenosine. However the blood of paludrine-treated guinea pigs did antagonize this action. This is taken as evidence that paludrine is metabolized to another compound with different pharmacological properties.

The considerations which led to the testing of antimalarials as antagonists of adenosine are discussed.

LINDSKA, J. P. & MORTON F. A. Tests of the Permeability of Fabrics to Biting by Mosquitoes. *J. Economic Entomol.* 1948 Oct. v. 41 No. 3 783-91

Laboratory and field investigations were made at Orlando Florida, on the permeability to mosquito bites of cloths of different weaves of washed and unwashed fabrics of several styles of gloves of certain highly permeable fabrics when lined with various nettings of tangle suit made of different materials and of different types of flying suit.

The mosquitoes used in the laboratory tests were *Aedes aegypti* and *Anopheles quadrimaculatus*. A mosquito cage was specially designed to fit on the thigh above the knee for some of the tests for others an arm cage was used. In testing the suits in the field, the salt-marsh mosquito *Aedes triseriatus* was available in large numbers.

The results are summarized in six tables and show that of fifty-six fabrics tested, twenty-one of them allowed fewer than five per cent. of the mosquitoes to penetrate nine being practically impervious & only one per cent. of the mosquitoes succeeded in biting through them. A number of these test were confirmed in the field, the best materials being Bird cloth nylon filled poplin Jo cloth bea nylon and one style of cotton twill. Suits made of these materials provided good protection against mosquito bites. Washing of the fabrics had no significant difference to their permeability.

Mosquito-biting through highly permeable fabrics was eliminated or reduced when coarsely woven, open-mesh netting was worn underneath and in some cases gave better protection than some of the most resistant fabrics when worn alone.

H. S. LECHE

Vol 46, No 6]

LEWIS, D J The Extermination of *Anopheles gambiae* in the Wadi Halfa Area
Trans Roy Soc Trop Med & Hyg 1949, Jan, v 42, No 4, 393-402,
 4 figs & 1 map [17 refs]

This paper should be read together with that by SHOUSHA [this *Bulletin*, 1949, v 46, 438] on the eradication of *Anopheles gambiae* from Egypt, as it completes the story of the disappearance of that mosquito from its northernmost extension and adds considerably to the discussion of how it came to travel so far

At the end of the Egyptian scheme a similar campaign was carried out in the neighbouring part of the Sudan In the winter of 1945-46 *A. gambiae* was eradicated from the 90-kilometre stretch of the Nile Valley between Faras (a border town at 22° 22'N) and Saras (21° 36'N) by a campaign based on hand distribution of 1 per cent paris green mixture to all potential breeding places Work was simple, rapidly effective, and undertaken by a staff of 17 men Proof of eradication is given by the fact that there has been no reappearance in 21 months since most larvicidal work was abandoned, during the last 13 of which it has been entirely abandoned and conditions have been unusually favourable for breeding

The work was intended mainly to provide a barrier to future invasions of Egypt by *A. gambiae* as it brings eradication back to a natural barrier of a long stretch of valley where there are few opportunities for breeding The author considers that this mosquito is native to the whole Nile Valley in the Sudan and perhaps to a part of Egypt, and claims the work as the first instance of the extermination of this species in an area of the Ethiopian zoogeographical region where it has occurred for many years

[This claim does not rest on quite secure ground as the evidence for the natural distribution of *A. gambiae* is circumstantial, and both the extent and the means of its extension are conjectural In 1938 it was not recorded north of Merowe (18° 29'N) In 1941 it was found at Wadi Halfa (21° 53'N) and in 1942 up to Assiut (27° 0'N) in Egypt There have been several records of malaria epidemics before this time within these limits So far as the Sudan is concerned the argument is that *A. gambiae* has long been present throughout the whole length of the Nile Valley in that country, but had not been reported because it had not been sought, most of the country being desert and many parts of the valley quite inaccessible However, past epidemics show its previous presence as there are no other effective carriers But *A. multicolor* is recorded as occurring So far as Egypt is concerned, the argument is that invasion is recent, importation being by boats, and past epidemics are attributable to favourable breeding conditions for other species such as *A. multicolor* The matter is one of considerable interest and cannot be considered settled]

G Macdonald

BRISOU, J, CASTET, A & AUTHEMAN, R Expérimentation d'un nouveau produit antilarvaire [Experiments with a New Anti-Larval Preparation]
Bull Soc Path Exot 1948, v 41, Nos 7/8, 485-7

"Gyron" is a yellow powder consisting of very finely ground cork in which is incorporated 5 per cent DDT The preparation floats on the surface of water for about three weeks and collects among the grass and rushes along the borders of marshes, favoured places for mosquito breeding Laboratory tests and practical experiments on vast areas of marsh have shown it to be an excellent larvicide, in doses less than 2 gm per square meter Pupae are not destroyed, but the imago dies soon after its emergence Aeroplane dusting with this material from a low-flying Tiger Moth has been used over extensive swamps near Ferryville, Tunisia In Tunisia larvae begin to reappear eighteen days

after treatment which should then be repeated. Water thus treated is toxic neither for domestic animals, nor for fish, amphibia nor the microfauna of ponds and marsh. This larvicidal measure together with DDT spraying of houses has resulted in almost the total disappearance of mosquitoes from the areas treated.

Norman White

MALAYAN UNIOS. Annual Report of the Malaria Advisory Board for the Year 1947 (including also 1946 and 1948) [MACGREGOR, R. B., Chairman]. 24 pp. 6 charts. 1948. Kuala Lumpur Govt. Press. [1s or 2s. 4d.]

The Board was first formed in 1911 with the object of co-ordinating the activities of estate owners, Government and private individuals, and took a large part in shaping the progress of malaria control in Malaya until its dissolution in 1941. It was reconstituted at the end of 1945 and has resumed its previous functions. This report briefly reviews the changes in the malaria situation during and since the Japanese occupation.

There was a great increase in malaria in 1942 and 1943 followed by an ostensible decrease in 1944 probably because the people saw the futility of attending hospitals where no drugs were obtainable. There has been a marked decrease since the end of the war partly owing to the fact that 1947 was a naturally healthy year but equally to the re-institution of control measures, the efficacy of which is now being reconsidered. The relative value of the various new methods of control is not yet clear. The one method which has been subjected to adequate trial is the use of proguanil (paludrine) and SN 7618 [chloroquine] with the aid of a grant from United Kingdom funds. A dose of 100 mgm. proguanil once a week has not been found effective but doses of 200 to 250 mgm. once a week have given effective suppression in most people with break throughs confined to children, and there has been no recorded failure of 300 mgm. once a week. A single weekly dose of 250 mgm. SN 7618 has about the same value and one weekly dose of 300 mgm. mepacrine compares in efficacy with 100 mgm. proguanil. Used therapeutically a single dose of 300 mgm. proguanil effects a clinical cure in *Plasmodium vivax* and *P. malariae* infections and in moderate infections with *P. falciparum*. A course of 300 mgm. daily for five days cures all types except those pernicious *P. falciparum* infections which require parenteral treatment. Used in this way proguanil is comparable with mepacrine.

Preliminary experiments have been carried out with DDT and Gammaxene as residual insecticides with promising but not yet convincing results. The nature of the breeding places in which *Anopheles maculatus* larvae occur makes it unlikely that much benefit can be derived from the larvicidal properties of these insecticides though their possibilities are being explored.

[The Board took a pioneer part in fostering malaria control for thirty years before the recent war. Its successful reconstitution will be welcomed by all interested in the subject.]

G. McDonald

REID, J. A. DDT — A Review of its Possibilities for Public Health Work in Malaya. *M. I. J. Malaya* 1948, Dec. 3 No. 2, 105-27 [80 refs.]

MCCAULEY, R. H., JR. FAY, R. W. SIMMONS, S. W. A Comparison of the Residual Effectiveness of certain Insecticides against *Anopheles quadrimaculatus* Linn. *J. National Malaria Soc.* 1948 Dec., 7 No. 4, 291-8

The residual effectiveness of three insecticides, DDD, Chlordane and chlorinated camphene was compared with DDT. The following spray combinations were used —

- (1) 5 per cent DDT-xylene emulsion
- (2) 5 per cent DDT suspension from 90 per cent DDT water-wettable powder
- (3) 5 per cent DDT suspension from 50 per cent DDT water-wettable powder
- (4) 5 per cent DDD (dichlor-diphenyl-dichlorethane)-xylene emulsion
- (5) 5 per cent Chlordane-xylene emulsion
- (6) 5 per cent Chlordane-kerosene emulsion
- (7) 5 per cent chlorinated camphene-xylene emulsion
- (8) 5 per cent chlorinated camphene suspension from 25 per cent chlorinated camphene water-wettable powder

Laboratory-bred *Anopheles quadrimaculatus* 3-4 days old were set free in rooms, the walls and ceilings of which had been sprayed with 200 mgm /sq ft of insecticide, and the rate of knockdown was recorded. Regular tests were made from two weeks after spraying up to seven months.

DDT was shown to be more effective than the other insecticides. Tests in which 5 per cent DDT xylene emulsion or DDT suspension from 90 per cent water-wettable powder were used gave similar results, but the DDT suspension from 50 per cent water-wettable powder was less effective both in knockdown and residual action. It is suggested that this difference is due to a masking effect by inert ingredients.

Chlordane was as effective as DDT during the first three months, but thereafter its effect was not so great. Chlordane-kerosene emulsion gave a more rapid initial knockdown than chlordane-xylene emulsion.

DDD gave a slow rate of knockdown and a lower kill after four hours than DDT or chlordane, but it was more effective than chlorinated camphene which was found to have comparatively little residual effect. *C M Harrison*

QUARTERMAN, K D Some Factors Influencing the Residual Effectiveness of DDT and Chlordane in Anopheline Mosquito Control *J National Malaria Soc* 1948, Dec, v 7, No 4, 300-306

The factors examined were —

- (1) dosage,
- (2) retreatment of surfaces,
- (3) the effect of furniture in treated rooms

(1) The experiments were carried out in houses of concrete block construction. Previously untreated rooms of uniform size were sprayed with xylene-Triton-X-155 emulsions of DDT or chlordane at the rates of 200, 400, 800 mgm /sq ft. The knockdown of insectary-reared *Anopheles quadrimaculatus* released into these rooms was recorded at intervals of 30 minutes over a period of 4 hours. Test releases of mosquitoes were made every 1½ months over a period of 6 months.

There was no striking difference in the results with different dosages of DDT, but DDT applied at 200 mgm /sq ft was superior to chlordane in its residual effect. A dosage of 800 mgm /sq ft of chlordane when freshly applied was more effective than the same dosage of DDT. The author suggests that this is due to the strong fumigant action of chlordane.

(2) The effect of re-treatment was tested by applying 200 mgm /sq ft of DDT or chlordane to a surface which had received the same treatment 3 months previously. Knockdown was achieved more rapidly than with a single treatment but there was little difference in the results with re-treatment at 200 mgm /sq ft and a single treatment of 400 or 800 mgm /sq ft.

Rooms treated in 1946 with 200 mgm./sq. ft. of DDT or chlordane were re-treated in 1947 with 50 100 200 or 400 mgm. insecticide per sq. ft. The toxicity was restored approximately to the original value but there was no cumulative effect.

(3) A higher percentage knockdown was obtained in treated rooms without furniture than in rooms with either treated or untreated furniture. Rooms with furniture treated at 200 mgm./sq. ft. proved more effective than rooms with untreated furniture or furniture treated at any other rate.

C. M. Harnson

DUNN I N. Hypersensitivity to Simian Malaria. *J. National Malaria Soc.* 1948, Dec. v 7 No. 4 285-74 [12 refs.]

This paper represents an attempt to demonstrate hypersensitivity in monkeys, infected with simian malaria, to various artificially produced malarial antigens. The monkeys used belonged to the species *Macaca mulatta* (spelt *Macaca*) and comprised 26 normal monkeys, 5 infected with *Plasmodium cynomolgi* and 16 infected with *P. knowlesi*.

Five antigens prepared from *P. knowlesi* were used. The basis of four of these was a mass of dried parasites obtained by haemolyzing the red cells of a parasitized monkey with distilled water repeatedly washing the parasites in the same and drying them in a vacuum.

Antigen I was prepared by powdering the dried parasites and making a 1 per cent. suspension in distilled water.

Antigen II was an extract of the dried parasites made by exposing 1 part to 100 parts of distilled water for one hour at room temperature and using the supernatant fluid.

Antigen III was a similar extract used after keeping the mixture in a refrigerator for 24 hours.

Antigen IV was made by extracting one part of dried parasites with 40 parts of Tyrode's solution followed by repeated freezing in dry ice and alcohol and thawing.

Antigen V was prepared by dissolving the mass of wet parasites in 0.1 N NaOH (1 gm. of parasites to 25 cc.) and neutralizing the solution with dilute phosphoric acid to bring the pH to about 8.0.

The control antigen was a 1 in 100 extract in distilled water of haemolyzed erythrocytes from normal monkeys.

In the case of *P. gallinaceum* Antigen I was the Malarial Antigen (Dried) of the Lederle Laboratories. A 1 in 100 suspension was used in distilled water.

Antigen II was a 1 in 100 extract in distilled water of the dried antigen kept at room temperature for 1 hour the supernatant fluid being used after settlement. The control antigen was a 1 in 100 suspension in distilled water of the dried material obtained from haemolyzed blood of normal chickens.

In testing these antigens, 0.1 cc. was inoculated intracutaneously. Readings were made at intervals of $\frac{1}{2}$ 24 48 and 72 hours after inoculation. In all cases the maximum response was obtained between 24 and 48 hours. The most significant results were obtained with *P. knowlesi* Antigen I.

Twenty-six normal monkeys showed a skin reaction averaging 3.7 mm. in diameter and never more than 5 mm.

In tests on 5 monkeys infected with *P. cynomolgi* one gave a reaction of 8 mm. in diameter two gave 7 mm. and two 5 mm. the reaction diminishing with the time which elapsed after the date of infection. The result was said to be statistically highly significant. [Whether this assumption is justifiable

on such small numbers is debatable, especially where the measurements between the normal upper limit of 5 mm and the maximum limit in infected animals of 8 mm showed a difference of 3 mm only]

The tests done on monkeys infected with *P knowlesi* were even less convincing, although here the species homologous to the antigen was being tested. In the case of these tests, on a total of 41 monkeys tested, the mean diameter of the reactions never reached 6 mm. The results obtained with the remaining *P knowlesi* antigens are detailed in tables. In all these the numbers of test animals are small and the results even less convincing.

The results with *P gallinaceum* antigen are also given in tables, but show little significance. Attempts to enhance the sensitization of infected animals by the use of various adjuvants were unsuccessful, as were attempts to demonstrate sensitization of macrophages *in vitro*.

[The general results of this work are not easy to evaluate. The small numbers of test animals used has been remarked upon and no indication is given of the means used for measurement of the reactions. This is important where fractions of a millimetre are given. The small margin between the diameters of the reaction in normal and test animals where the greatest reaction in the latter is only 8 millimetres and the normal may be as high as 5, obviously leaves many loopholes for error both in making measurements and in drawing inferences from them.]

H E Shortt

HARRIS, A & REIDEL, L M Evaluation of the Complement Fixation Test for Malaria *Amer J Trop Med* 1948, Nov, v 28, No 6, 787-95

The title is a little misleading as the paper is an account of complement fixation tests in malaria carried out by the authors themselves rather than an evaluation of the test in the light of previous work on the subject.

Merthiolated serum from sporozoite-infected donors, supposedly normal serum from students and serum from donors suffering from tuberculosis or syphilis, were the materials used in the tests. The Kolmer complement fixation test was employed, the antigens used being dehydrated corpuscle masses from monkeys infected with *Plasmodium knowlesi* and chickens with *P gallinaceum*.

As the functioning of the test is largely dependent on the potency of the antigen, the relative efficiency of these two antigens was first tested. Two *gallinaceum* and two *knowlesi* antigens were tested on 629 sera from sporozoite-infected donors, while human, monkey and chicken red cell stromata were used as control antigens.

The results showed extreme variability not only between the different antigens but between different lots of the same type of antigen. Thus, the same serum might give a strongly positive reaction and a strongly negative reaction with different antigens and there were other equally disconcerting results. In these tests, the *gallinaceum* antigens were decidedly more sensitive than the *knowlesi* antigens.

In another series of tests on 224 sera from the same series, the *gallinaceum* antigens again showed a higher proportion of positive results than the *knowlesi* antigens while in a third series of 31 similar sera, this result was reversed and a *knowlesi* antigen gave the higher number of positive reactions. The lower dilutions of antigen gave the greater number of positive reactions.

When the results of complement fixation tests were compared with the results of examination for parasites in the blood, equivocal results were obtained. Thus, the presence of malaria parasites in the blood was associated with both negative and positive complement fixation tests.

The specificity of the complement fixation test was next tested on 961 bloods from supposedly non-malarial donors, with both *gallinaceum* and *knowlesi*

antigens. The results went to show that less than 1 per cent. of false positive results was obtained so that the test could be regarded as highly specific so far as the positive results were concerned. Further evidence to this effect was obtained with sera from tuberculous and syphilitic patients.

The general conclusions to be drawn from the investigation are the necessity for the production of a standard antigen of constant potency, the fact that *gallinaceum* antigen appears to be the more reliable as well as the more specific antigen and the fact that the complement fixation test in its present form is no substitute for the finding of malarial parasites in blood films as a means of diagnosis.

H. E. SHAW

BLACKWATER FEVER

JONCHERE H. AUFFRET C. & RAOULT A. Un nouveau cas d'anurie prolongée au cours d'une fièvre bilieuse hémoglobino-urique [A Case of Prolonged Anuria during Blackwater Fever] *Bull. M&I de l'Afrique Occidentale* *Ann. pédiat.* 1947 v. 4 No. 4 403-13

A long account is given of the clinical and pathological findings in a case of haemoglobinuria occurring in a European patient employed for 25 years in French West Africa and with a long history of chronic malaria. The haemoglobinuria appeared eight days after a heavy course of sulphathiazole treatment for chronic urethral discharge. A diagnosis of blackwater fever was made. The patient was oliguric from the beginning and rapidly became anuric. He died after a blood transfusion on the sixteenth day of his illness. Three days before death 432 grammes of urine containing traces of sulphobamide were removed by catheter. The following day he passed 1 100 cc. of urine which had a low urea concentration and contained traces of blood pigments, many casts and some blood cells. Vigorous treatment was administered which included intralumbar infiltration with novocaine, intravenous novocaine and intensive intravenous vitamin C dosage. (The vitamin was given because of its antihistamine activity in high dosage.)

Autopsy was performed immediately after death and the lesions of the organs including the kidneys and liver are discussed. The renal lesion was regarded as a toxic-infectious nephritis with extreme epithelial damage and heavy deposits of haemoglobin-pigmented material in the lumina of the tubules. There was considerable inflammatory infiltration. Crystals resembling those of sulphathiazole were also present in the tubules. In the liver the centrilobular veins and attendant capillaries were dilated and engorged and there was fatty degeneration in the cells of the centrilobular region. The Kupffer cells contained malarial pigment and there was a great deal of haemosiderin in the hepatic cells.

The authors suggest that the high dosage of sulphobamide might have influenced the development of lysis in the patient already heavily infected with malaria.

B. G. MARGRAH

CARAYON A. Les formes anuriques de la fièvre bilieuse hémoglobino-urique. Bases cliniques, anatomo-pathologiques et physiopathologiques du traitement. A propos de quatre cas personnels. [Anuria in Blackwater Fever. Clinical, Anatomical and Physiological Basis of Treatment in Four Cases.] *M&I Trop. Marcellina* 1948 July-Aug. Sept.-Oct. 8 No. 4 432-50

In three years at Conakry the author observed 15 anuric cases of blackwater fever four of which were treated by surgical interference including

decapsulation of the kidneys and infiltration of the renal pedicles with novocaine. The six anuric cases occurred in a total of 25 European cases, of which six others were polyuric. Other cases of blackwater fever, details of which are not discussed, were seen in Africans and in Lebanese. All European cases occurred in patients over the age of 30 and were associated with malaria treated with quinine.

The four cases which were treated surgically are dealt with fully, and detailed notes are given. These cases were all oliguric from the first appearance of blackwater. Anuria, defined as the passage of less than 50 cc of urine in 24 hours, developed within two days in all of them. Blood non-protein nitrogen (NPN) was high by the time of development of anuria. Another constant feature was the low urea concentration in the urine. Oliguria occurring early, accompanied by a reduction in urinary nitrogen and a rising blood NPN indicated increasing renal damage, which was concomitant with the haemoglobinuria and signs of liver failure. The author regards these cases as examples of the hepato renal syndrome.

Apparently autopsies were not performed but at operation in two cases the kidneys were found to be enlarged, firm and congested.

There is a long and interesting general discussion on the pathogenesis of renal failure in blackwater fever. The mechanical blockage theory is discussed and the conclusion is reached that it cannot explain the appearance of anuria. Other possible mechanisms are considered.

The author concludes that there are two predominant factors concerned in the pathogenesis of the renal damage, their relative importance depending on the circumstances of the individual case. The first of these factors is toxic-infectious and results from the malarial infection, it produces renal changes often associated with the hepato-renal syndrome. The other factor is tissue anoxia. Its importance is variable and depends upon the two elements which make it up, viz, (a) anaemia, which is more or less intense and dependent upon the malarial infection and haemolysis, and (b) vasomotor disturbances in which the intrarenal capillary pressure is affected. The author considers that the rôle of tissue anoxia in blackwater fever anuria has been over-estimated by Anglo-Saxon authors, possibly because of its importance in post-transfusional and crush syndrome anuria, where the appearance of shock is of more importance than in blackwater fever. In the four cases described by the author, shock was absent. In these cases he regards anaemia as being the more important in the production of tissue anoxia, since malarial anaemia presumably preceded that of the blackwater fever. He believes that this explains the inconstant effect on blackwater fever anuria of the surgical therapeutic measures described, measures which are more effective in crush syndrome and post-transfusional anuria, in which the vasomotor element is more obvious. No evidence of increased intrarenal pressure was found in his cases.

Theoretically, treatment of the individual case would depend upon the importance or otherwise of the vasomotor factor. If this were considerable, infiltration of the renal pedicles and decapsulation of the kidneys would probably produce good diuresis. Where tubular epithelial lesions were severe, the relief of the vasomotor effect by infiltration and decapsulation would restore diuresis but the urine would be poorly concentrated. Where severe tubular lesions and pronounced vasomotor states co-existed and operation was performed late, the results would be unsatisfactory.

There is a detailed discussion of the treatment of anuric cases in general. The author points out that it may be dangerous to attempt intensive alkali therapy and suggests that the anaemia which in his view is the main cause of tissue anoxia, should be treated with liver extract and transfusion. Repeated inhalation of oxygen may also help in attempting to control tissue anoxia.

Malaria should be treated and antimalarial drug given parenterally in the first instance. In the treatment of anuria he advises against the use of diuretics. He recommends injections of plasma and physiological saline in moderate doses. Hypertonic serum saline may be dangerous in the anuric period. Intravenous injection of novocaine which has given very successful results sometimes in anuria produced by sulphonamides may be tried but the author prefers infiltration of the renal pedicles with novocaine with the object of releasing sympathetic vaso-constrictor activity which may be responsible for the tissue anoxia. The technique of various surgical procedures is briefly described.

[This paper should be read in the original by those interested in the subject. In general the author's conclusions are in agreement with those of recent authors in the Anglo-Saxon world.]

B. G. MARSH

TRYPANOSOMIASIS

FERRIRA, F. S. da C. As tripanosomíases nos territórios africanos portugueses. Africa Ocidental (Angola e Guiné) Africa Oriental (Moçambique) [The Trypanosomiasis in Portuguese African Territories, West Africa (Angola and Guinea), East Africa (Mozambique)] 32 pp. 12 folding maps (2 coloured). In Portuguese and English. 1943.

In Angola and Portuguese Guinea, sleeping sickness is more important than animal trypanosomiasis, while in Mozambique the reverse is the case. The difference is associated with the nature of the country, the density of population, and the species of tsetse flies which transmit the infections. In all three colonies information is incomplete and further investigations and control measures are being planned and organized.

Angola—Sleeping sickness (*Trypanosoma gambiense*) is almost limited to the area north of Lat. 12°S though there are a few endemic foci further south. In the Congo Province the chief centre of infection 3,500 cases were diagnosed in 1947. Domestic stock of all kinds totals nearly 2 millions. Infections with *T. brucei*, *T. congolense* and *T. uniformis* occur but most of the animals are kept in the tsetse free southern part of the colony. Tsetse flies infest about one-third of the country chiefly in the north. *Glossina palpalis* (with the varieties *wellmani* and *fusripes*) is the commonest species and *G. morsitans*, *G. pallicera*, *G. f. f. f.*, *G. schoutedeni*, *G. brevipalpis* and *G. longipalpis* also occur. Measures against trypanosomiasis include diagnostic surveys of the population and treatment with drugs, periodical inspection of animals with slaughter or treatment of those infected, a certain amount of clearing of vegetation, and destruction of game. The service forms part of the Public Health Service.

Portuguese Guinea—Conditions in the central and southern parts are not well known but in the west and east in the areas surveyed sleeping sickness (*T. gambiense*) is pretty generally distributed, the incidence being higher in the west than in the east. Trypanosomes were found much more frequently by gland puncture than by blood examination, the proportion in 427 patients examined by both methods being 7.5:1. Many cases were in the nervous stage—83 per cent. in the west 88 per cent. in the east. In the west, where there are large tidal estuaries and mangrove swamps with evergreen vegetation, the population is much exposed to *G. palpalis* while in the east where the climate is drier with open bush and forest vegetation and where *G. morsitans* is present contact of man with tsetse flies is less though *G. palpalis* also occurs near the rivers. Domestic stock of all kinds totals about 334,000. Infection with

T. congolense, *T. vivax*, *T. brucei* and *T. theileri* occur and it is noteworthy that *T. brucei* was found in monkeys (*Cercopithecus aethiops*) of the mangrove swamps [*T. brucei* is omitted in the English translation which includes monkeys among animals infected with *T. vivax*], a further report by the veterinary staff will shortly be published.

Four species of tsetse flies—*G. palpalis*, *G. submorsitans*, *G. longipalpis* and *G. fuscus*—are present, the first being much the commonest and the last the rarest. Polymorphic trypanosomes were found in 2.7 per cent of 2,632 tsetse flies examined. Other blood sucking flies identified were species of *Tabanus*—*bignellatus*, *brucei*, *distichus*, *gratus*, *nigrostriatus*, *roseus*, *viridis*, *taeniola*, *variabilis*, *Chrysops distichipennis* and *C. longicornis*, *Haematopota decora*, *H. lacessens*, and *H. maculans*.

A delegation of the Lisbon Institute of Tropical Medicine forms a permanent sleeping sickness service and has three sections: (1) for investigation, (2) for diagnosis and treatment of sleeping sickness, (3) for combating tsetse flies.

Mozambique—There are only about 200-300 cases of sleeping sickness (*T. rhodesiense*) a year and they occur in somewhat isolated foci. Domestic stock of all kinds amounted in 1945 to nearly 1 million of which about 600,000 were cattle. In the areas important for cattle breeding, infections with *T. congolense* alone are the most widespread, mixed infections with *T. congolense* and *T. vivax* come next, pure infections with *T. vivax* are infrequent, and *T. brucei* infections are very rare, a few infections with *T. simiae* have occurred. Tsetse flies infest about three-quarters of the colony; the four species present are *G. morsitans* (the most important), *G. pallidipes*, *G. brevipalpis* and *G. austeni*. Mechanical transmission by other blood sucking flies is also thought to be important. The area of Viputo [see Horn, in this *Bulletin* 1948 v 45, 1068] is ideal for cattle breeding and has therefore been specially studied; the relative frequency of occurrence of pathogenic trypanosomes was: *T. vivax* 66.84 per cent, *T. congolense* 15.76 per cent and mixed *T. vivax* and *T. congolense* 17.4 per cent [these figures seem to conflict with the statement given above]. *G. brevipalpis* and *G. austeni* are present as well as other blood sucking flies—*Tabanus*, *Haematopota*, *Stomoxys* and members of the family Hippoboscidae.

The trypanosomiasis service is controlled by a Council formed from the Health, Veterinary and Agricultural Services, the Department for Native Affairs, and the Mission for the Fight against Trypanosomiasis; the last named is the executive body and consists of medical, veterinary and entomological sections. Clearing of vegetation is being done in several areas, DDT and gammexane are used, some destruction of game has been carried out, and infected people and animals are treated; phenanthridinium proved to be the best drug for animal trypanosomiasis [Antrycide is a later discovery].

Game reserves—In Angola there are 7 game reserves in tsetse free areas, in Portuguese Guinea there is 1, and in Mozambique there are 5, but in the last colony freedom from tsetse flies is difficult to maintain.

J. F. Corson

NORTHERN RHODESIA. Game and Tsetse Control Department. Annual Report for the Year 1945 [VAUGHAN-JONES, T., Acting Director] 15 pp. 1946. Lusaka: Government Printer.

— Annual Report for the Year 1946 [VAUGHAN-JONES, T., Director] 19 pp. 1947.

— Annual Report for the Year 1947 [VAUGHAN-JONES, T., Director] 16 pp. 1948.

Reference has already been made [this *Bulletin*, 1948 v 45, 879] to an interesting administrative arrangement in Northern Rhodesia. As the main

tsetse problem relates to *G. morsitans*. It is closely connected with game. The Government views the whole subject of game (both conservation and destruction) as it affects the economic needs of the country and for convenience adds Fisheries. The three subjects are administered by one department.

The three annual reports give much detail of considerable interest. One notices that human sleeping sickness (*T. adense*) has a tendency to persist in certain spots: for instance an area east of Fort Jameson. Here *G. morsitans* has been attacked, successfully it seems, by discriminative clearing and the destruction of game. Much of the land has been resettled in a carefully planned way and the success of the whole measure is shown by the fact that in some places the people have cattle. Another of these centres of sleeping sickness is the Feira District in the south-east. The situation here continues to give some anxiety and the human population has been withdrawn from a part of it.

It is noted that extensive use is made of roadside clearings to reduce the number of tsetse carried by vehicles. It is of course only a partial measure for it would be almost impossible to make a clearing so wide that no tsetse would come out to the road, but it appears to be valuable.

The southern limit of rinderpest is at present roughly speaking the boundary between Tanganyika and Northern Rhodesia. In order to prevent the southward spread of the disease an area has been marked off as a cordon along which game destruction is practised. The spread of rinderpest and the threat to territories further south is of considerable international importance.

P. A. Buxton

Lewis D. J. *Glossina tachinoides* in North-East Africa. *Bull. Entom. Res.* 1949 Mar. v. 39 Pt. 4 529-30 [10 refs.]

The tsetse fly *Glossina tachinoides* Westwood 1850 is an important vector of trypanosomes in parts of West Africa. Although it was reported from Arabia by CARTER (*Brit. Med. J.* 1909 Nov. 17 1393) as long ago as 1906 this finding as the present author observes has been questioned by other workers as a dubious record to be accepted with caution. In any case the gap in its distribution between West and East Africa is considerable. In 1939 GIBBONI (this *Bulletin* 1940 v. 37 401) reported *G. tachinoides* from the Gambella district of Western Ethiopia which borders on the Anglo-Egyptian Sudan.

The present writer now reports on a single female specimen of *G. tachinoides* found by Dr. Bloss of the Sudan Medical Service at Agulle (8° 4' N. 34° 04' E.) which borders on the Gambella district. Agulle is a remote police post on a stream flowing from the Ethiopian hills towards the swamps of the Nile valley: it is difficult to reach at most times of the year. The fly was found when biting the collector near a pool in the stream bed. This is the first record of this species in the Anglo-Egyptian Sudan although many collections have been made of *G. falcipes* subsp. *f. scipes* and *G. morsitans*.

The gap in distribution of *G. tachinoides* includes swamps of the Sudd region, unsuitable for tsetse flies but also a large area to the west through which flow many tsetse-infested tributaries of the Nile system. It is not known why this species is not present in these tributaries but the author notes that many insects in the Sudan show great discontinuity in distribution probably owing to past climatic changes.

H. J. O'D. B. McGilguy

See also p. 514 GORDON & CREWE The Mechanisms by which Mosquitoes and Tsetse Flies obtain their Blood Meal.

LAPEYSSONNIE, L. Un cas exceptionnel de pan-chimio résistance chez une trypanosomée [Pan-Chemoresistance in a Case of Sleeping Sickness] *Bull Soc Path Exot*, 1948, v 41, Nos 9-10, pp 613-20

The author reports two cases of long-standing sleeping sickness infection which were remarkably resistant to repeated courses of treatment by a variety of arsenicals (atoxyl, tryparsamide, and orsanine), by suramin, and by tartar emetic. One of these infections lasted for 8 years, and its course and treatment are described in considerable detail. The other lasted for 12 years, and is merely mentioned. The patients were exceptional among 46,878 diagnosed in a sector of the Pagouda area of Togo.

The case which is described in detail is of a girl first diagnosed in July 1938 when she was 4 years old. Trypanosomes sometimes reappeared, after a temporary remission, even during an actual course of arsenical treatment. In about six years the patient had received, per 20 kgm body weight, a total of 40.15 gm of various arsenicals, 16.8 gm suramin and 4.6 gm tartar emetic. She was then given several courses of pentamidine injections, and by about April 1947 the infection finally appeared to be sterilized. [Eventual sterilization is attributed to the pentamidine treatment, but this seems unlikely, since the dosage reported was minute—0.003 mgm per kgm for the first two courses of injections, followed by 1.0 mgm per 25 kgm for two later courses.]

The patient was subjected to 27 lumbar punctures between 1938 and 1947, and the cerebrospinal fluid remained normal throughout this period. She always had generalized enlargement of lymph glands, and developed an enlarged heart and systolic murmur, an enlarged tender liver, and crepitant râles at the bases of both lungs. These signs are attributed by the author to myocardial damage consequent on the long-continued infection. Nevertheless, the patient's general condition remained remarkably good.

In an interesting but highly speculative and controversial discussion the author gives his view that the drug-resistance was inherent in the trypanosome and not produced by treatment. He believes that the trypanosome was of animal and not of human origin, on the slender evidence of its drug-resistance, and its predilection for the lymphatico-blood system rather than the central nervous system. He draws attention to drug-resistant sleeping sickness exhibiting the following features—

- (a) a strictly delimited geographical localization,
- (b) predominance of long forms (32 μ) and high incidence of blood infections,
- (c) an increasing incidence since 1941,
- (d) relative benignity, cases often remaining in perfect health for 3 years.

The author postulates the theory [hardly acceptable in its entirety] that relatively heavy blood infections, as in these cases, result in a high production of antibodies, which get into the cerebrospinal fluid and protect the central nervous system. When the strain becomes older, either in an individual or in a community the power of reproduction decreases, antibodies become less numerous, and sero-resistant "biological mutants" are consequently able to penetrate into the central nervous system. Thus, the older a strain is, in the sense of adaptation to man, the less will it tend to be found in the blood and the more neurotropic does it become. In the extreme development along these lines, cases occur in which the lymphatico-blood stage is insignificant and the nervous stages predominate almost from the start, as in the "*grands suspects d'Ebolowa*" [see this *Bulletin*, 1946, v 43, 1122].

In discussion of this paper, MURAZ questioned whether irregular time-intervals between injections might not have contributed towards production of the drug-resistance described.

E M Lourie

See also p. 549 SENECA, HENDERSON & HARVEY Effect of Hyaluronidase and of Hyaluronic Acid on Cultures of Trypanosomes, Leishmania, and Amoebae.

ROMAÑA C. Xenodiagnóstico colectivo. Índices de infección por *S. cruzi* de niños en escuelas de Catamarca, Chaco Formosa, Corrientes y Entre Ríos. [Incidence of infection by *T. cruzi* among school-children of Catamarca, Chaco Formosa, Corrientes, and Entre Ríos, as found by Xenodiagnosis.] *An. Inst. Med. Regional Tucumán* Argentina, 1948, Dec. v 2 No. 2 185-96, 9 figs. English summary

In 1946 ROMAÑA and his colleagues reported finding 34 positive (by xenodiagnostic methods) among 148 school-children (23.3 per cent.) in Tucumán Santiago del Estero and Catamarca (this Bulletin 1947 v 41 404). Since that time other school-children have been tested 34 in Campo Largo (in Chaco) of whom 3 proved positive. At two schools in Catamarca 15 and 1 children respectively were tested and 2 of each were positive. Here the dwellings are of adobe (sun-dried bricks) with wood and earth roofs and Triatomidae are to be found in them. In Mercedes a district in the middle of the Province of Corrientes 4 were positive out of 63 tested and 3 out of 69 in Entre Ríos. The rate was higher 9 out of 40 in Formosa where *T. infans* was found in large numbers. A spot map indicates the places visited altogether 233 children were tested and 23 (9.8 per cent.) were positive. It was observed that in the places with higher percentage of infection the dwellings were of a poor standard and the general sanitary conditions bad. H. Harold Scott

CONEJOS M. Cultivo de *S. cruzi* en embrión de pollo [Cultivation of *T. cruzi* in Chicken Embryo.] *An. Inst. Med. Regional Tucumán*, Argentina, 1948 Dec. v 2, No. 2 175-83 5 figs. English summary

The author recalls that in 1939 ROCHA and ROMAÑA inoculated 10 chicken embryos with *T. cruzi* 5 with a culture 3 with dejections of *Rhodnius prolixus* rich in *T. cruzi* and 2 with the blood of an infected guinea pig. With the exception of one of the last in which a trypanosome was found at the end of a week, all were negative. [See this Bulletin 1940 v 37 415.]

Now the author inoculated chick embryos of 10 days incubation with a glucose-agar liver broth culture of *T. cruzi* and after 4 days found nests of multiplying trypanosomes in the organs. Better results were obtained if 5-6-day embryos were used, instead of 10-day. Trypanosomes appeared in the circulation from the 10th day after inoculation and remained till hatching. At birth none was found in thin or thick blood film but xenodiagnosis was positive in one instance on the first day of life. On the 7th day nests of developing trypanosomes were seen in all the organs heart liver spleen kidneys glands, muscles lungs and bone marrow. H. Harold Scott

SENECA H. HENDERSON E. & HARVEY Martha. Purification of Hemoflagellate Cultures with Antibiotics. *Amer. J. Trop. Med.* 1949 Jan., v 20 No. 1 41

Neither penicillin in 1,000 units and 5,000 units per 5 cc. supernatant overlay nor similar amounts of streptomycin nor 5,000 units each of penicillin and streptomycin together had any effect on the vitality and the intensity of the growth of *Leishmania donovani* and *Trypanosoma cruzi*.

For the purification of contaminated cultures of hemoflagellates 5,000 units of penicillin and 5,000 units of streptomycin added to such cultures in 5 cc. of saline ordinarily kills all contaminants in the second generation.

MANSO SOTO, A E & MARTÍNEZ, A La colección de triatómidos de la M E P R A [The M E P R A Collection of Triatomata] *Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Publicación No 74* 1948, 1-18, 5 figs

ROMAÑA, C & ABALOS, J W Acción del "Gammexane" sobre los triatómidos "Control" domiciliario [Control of Domestic Triatomata with Gammexane] *An Inst Med Regional Tucuman, Argentina* 1948, Dec, v 2, No 2, 95-106, 5 figs English summary

Preliminary laboratory experiments with Gammexane involved contact of nymphs and adults of various domestic species of *Triatoma* with variable proportions of gamma isomer mixed with inert dusts. One part of Gammexane in 2,000 gave 100 per cent mortality in twenty-four hours. A surface with 500 mgm/sq metre Gammexane caused the *Triatoma* to show toxic symptoms and finally to die. DDT was less effective—whereas 100 per cent mortality of adults could be obtained with DDT, the nymphs were more resistant, only approximately 50 per cent were killed and this percentage did not increase with increasing concentrations of DDT.

An account of the use of Gammexane as (1) a fumigant and (2) in water mixtures in rural areas in Argentina is given.

(1) The use of smoke generators was found to be ideal for the treatment of houses.

(2) In water suspensions the gammexane used contained 10 per cent gamma isomer and was made up at the rate of 25 and 50 gm per litre—a concentration of 500 mgm Gammexane per sq metre applied to roofs and walls of dwellings was found to be the most effective. The necessity for treatment of furniture and household goods for complete eradication is emphasized. This treatment gives protection against reinfestation for six months and is excellent for a large scale campaign.

C M Harrison

LEISHMANIASIS

See also p 549, SENECA, HENDERSON & HARVEY, Purification of Hemoflagellate Cultures with Antibiotics

See also p 549, SENECA, HENDERSON & HARVEY, Effect of Hyaluronidase and of Hyaluronic Acid on Cultures of Trypanosomes, Leishmania, and Amoebae

PETRISHCHEVA, P A [Sandflies (*Phlebotomus*) in various Landscape Zones of USSR I Sandflies in Hot Deserts in Central Asia] *J General Biol* Moscow 1946, v 7, No 1, 65-84, 4 figs [15 refs] [In Russian] [Summary taken from *Rev Applied Entom* Ser B 1949, Feb, v 37, Pt 2, 19]

In view of the discovery by Latushev that cutaneous leishmaniasis occurs in natural foci and the probability that visceral leishmaniasis and sandfly fever also do so, the distribution of sandflies (*Phlebotomus*) in their natural habitats has become of epidemiological importance. Investigations were therefore made in the deserts in Turkmenistan, southern Tadzhikistan and Uzbekistan. Most of the work was done in sand desert, loess desert, which is covered with ephemeral vegetation, and stone desert, and little material was obtained from salt desert. The sandflies, which were collected chiefly on sheets of sticky

paper were very numerous and comprised practically all the species of *Phlebotomus* that occur in Central Asia, but each had its regions of prevalence. They were common in the burrows of gerbilles (*Rhombomys opimus*) and ground squirrels (*Spermophilopsis leptodactylus*) in the sand desert, the burrows of tortoises in the loess desert, and holes occupied by wolves, jackals and foxes in the stone desert. Detail are given of their seasonal occurrence and abundance in or near these places, and the species associated with each are enumerated.

The conditions that render the burrows or holes of animals in the desert suitable for the breeding of sandflies are discussed. The microclimate in them is characterised by a rather high humidity and moderate temperature, and they afford shelter from the extremes of summer heat and winter cold and the strong drying winds that prevail outside. Moreover they are frequently used as temporary shelters by various small mammals, reptiles or birds, on which the sandflies probably feed. Reptiles are abundant in the sand desert and notes are given on the species that occurred in the burrows of *Rhombomys* in association with *Phlebotomus* spp.

Sandflies were abundant in and near the burrows of *Rhombomys* and *Spermophilopsis* in the sand desert from the end of April till the middle of July and readily attacked man in the evening. Their frequency varied with the size of the rodent colonies. They occurred at fairly great distances from the burrows during the evening and night and it was often observed that they left them in numbers in the evening and returned in the early morning hours. Tortoises were numerous in the loess desert and were active for about three months from March when the vegetation appears until May when it dries up. They then remain dormant in their burrows for nine months after having blocked the entrances with a thick layer of soil. Sandflies were common from mid April until early May but none was observed after the end of May until the following spring. There was thus apparently only one generation a year with a long developmental period in the burrows. In the stone deserts in the mountains, sandflies occurred from April to the end of November in holes occupied by wolves and were most abundant for about two months in early summer. They were also numerous in the holes of jackals and foxes. They flew out during the evening and night and readily attacked man.

FEVERS OF THE TYPHUS GROUP

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. SECTION ON MEDICAL SCIENCES. Rickettsial Diseases of Man.

This book is reviewed on p. 590.

FREEMAN G. VARELA, G. PLOTZ H. & ORTIZ MARIOTTE C. Typhus Fever in Mexico: a Study of Epidemiology by means of Complement-Fixation. *Amer. J. Trop. Med.* 1919 Jan. v. 29 No. 1 63 p. 2 figs.

This study was carried out in 1914-1915 and had the benefit of the collaboration of the late Colonel Harry Plotz. It is of special interest in connexion with the widely held belief that louse-borne typhus in Mexico often originates from murine rickettsiae which are capable of adapting themselves to transmission from man to man by lice.

Out of the 237 serum samples collected from all over Mexico in which positive reactions were obtained with complement fixation test at titres of 1/10 or over the great majority (184) gave higher titres with epidemic antigen. 48 had dominant murine antibodies and the remaining 5 which were negative

for epidemic and murine antigens, reacted with Rocky Mountain spotted fever antigens. The predominant type was, therefore, the epidemic, but in some areas murine infection was dominant, and in others it occurred side by side with epidemic infection.

In two isolated epidemics in which it was suspected that infection had originated from a murine strain the reactions showed that the earliest cases were epidemic in type. These two "negative instances" are not regarded as conclusive in themselves and the cautious conclusion of the authors is that "any suspected immunological relationship between the murine and classical types is not self-evident from these observations."

In some proved cases of typhus the titres had fallen below 1-10 two to four years after infection.

John W D Megaw

FREEMAN, G, CASTILLO SOLOGUREN, F & ESPINOSA, H Typhus Fever in Peru a Study of Epidemiology by means of Complement-Fixation *Amer. J. Trop Med* 1949, Jan, v 29, No 1, 71-8, 4 figs

This study was carried out on the same lines as the one described in the preceding abstract. Out of 374 serum specimens collected from all over Peru, and received in Washington in good condition, 192 gave positive complement-fixation reactions, and in every case this was of the epidemic type. The infected regions were exclusively the elevated *sierra* and *altiplano* areas of Central and Southern Peru, the small number of positive specimens received from the coastal cities were from persons who had come from crowded villages in the *sierra*.

There was evidence that the titre of the reaction tended to fall after about six months and that negative reactions after that period did not necessarily exclude the diagnosis of typhus.

John W D Megaw

WEYER, F Die Kleiderlaus als therapeutisches Testobjekt (Zugleich ein Beitrag zur Wirkung von Penicillin auf Rickettsien) [The Body Louse as a Subject in Chemotherapeutic Tests] *Ztschr f Hyg u Infektionskr* 1948, v 128, Nos 5/6, 499-505

The louse was found very tolerant of intrarectal injections of various chemicals such as sulphonamide solutions, penicillin, etc.

The insects were first inoculated by Weigl's method with typhus rickettsiae and then with chemicals whose therapeutic value was to be tested.

Para-aminobenzoic acid was found completely inactive but penicillin, given at intervals of three, twenty-four, and forty-eight hours, after inoculation, was remarkably effective, causing complete inhibition of growth in seven out of nine batches, each consisting of 30 lice. The action of the drugs was judged by examining stained smears of the guts of the lice. Apart from one batch of lice treated with penicillin which had accidentally become inert the result was that out of 148 lice examined after treatment only one was found to harbour visible rickettsiae, whereas among untreated control lice 77 per cent were positive.

The author admits that the louse serves practically as a test tube and that the results must be regarded as preliminary and tentative. He suggests, however, that the method may possibly be applicable to the testing of vaccines [presumably by introducing the vaccines into the rectum and later inoculating the insects with virulent cultures].

John W D Megaw

CARRERY L. & MOUTARDIER G. Note sur l'agglutination du *Proteus* O19 par des sérums humains et en particulier par des sérums de femme enceinte [Note on Agglutination of *Proteus* O19 by Human Sera, in particular by Sera from Pregnant Women.] *Ann Biol Clin.* 1948 Sept. Dec. v 6 Nos. 9 10 524-6

GRATCH [this Bulletin 1944 v 41 197] found that a large proportion of sera from pregnant women agglutinated *Proteus* O19 often to high titres. The present authors examined sera from various sources by a slide agglutination method, the results being classified as positive (agglutinating in less than two minutes) late or false positive (agglutinating in over two minutes) and negative. Of 57 sera from women who were pregnant or had recently been confined, 35 were positive and one was negative the remaining serum giving a late positive result. Of 493 sera from men or non-pregnant women 133 were positive 202 were negative and 148 gave a late positive result. The positive sera from pregnant women were tested by a tube method. The mean titre was 1/40 and no titre higher than 1/90 was recorded. High titres as reported by GRATCH were thus not found in the present series. The authors suggest that the only practical application of their observations would be in the diagnosis of pregnancy, since a negative test is not likely to be found in a pregnant woman.

[See also NELSON and CRICKSHANK this Bulletin 1945 v 42, 263 and BAXTER ibid 1949 v 46 129] J C Crickshank

ZALMAN M. DAVID P. & HORTOPANU Reactii biologice in "tifosul exantematic." [Biological Reactions in Epidemic Typhus.] *Rev Ch Medic Med* Bucharest 1948 July-Aug v 37 Nos. 7-8 352-66 3 figs. French summary

Because of the clinical analogy between uraemia and nervous forms of epidemic typhus, the authors studied certain biochemical reactions in the blood and urine of 180 in-patients in a hospital in Timisoara Rumania.

Blood urea was increased in all nervous and cerebral forms and its level has an important prognostic significance when it exceeds 1 gm. per thousand a fatal result may be expected.

Chlorides were found to be diminished in blood and urine alike in every case and this was particularly significant in the early stages.

Blood sugar was normal in the common forms but it was variable in the graver cases.

Uric acid was always increased usually from the end of the first week.

The Takai's Ara reaction was usually found positive especially in the severe forms. The authors state that when the intensity of this reaction is parallel with that of the Weil Felix the prognosis is good but when it is accompanied by a low titre of the Weil Felix reaction the prognosis is grave.

As a result of these observations the authors recommend that repeated examinations of blood urea should be made in every case of epidemic typhus, and that when it is increased, treatment appropriate to uraemia should be instituted. They also recommend that in severe cases the patient should be flooded [monitored] with normal saline by every possible route so as to re-establish the normal chloride level in the blood and urine. The cerebrospinal fluid was also studied biochemically in 10 cases only. From these few studies, the authors suggest that the result may serve to distinguish between the true meningo-encephalitic and the other nervous form of the disease. In the former case it shows meningeal or encephalitic features and in the latter a toxic picture.

H J O'D Burke-Saffart

ZAHARIA, N I & BERNFELD, M Viteza de sedimentare a hematului in cursul tifusului exantematic [The Erythrocyte Sedimentation Rate in Epidemic Typhus.] *Rev Stiintelor Med* Bucharest 1948, Sept-Oct, v 37, Nos 9/10, 463-74 French summary

The following is a translation of the authors' summary —

During the first week of the disease, the sedimentation rate is somewhat variable in most cases, the values vary between 0 and 20 mm after 1 hour. Towards the end of the period, the sedimentation rate increases to 30 or 40 mm after the first hour. During convalescence, it is maintained at this level. There is no correlation between the gravity of the illness and the height of the sedimentation rate. When there are suppurative complications, the rate is appreciably increased. The estimation of the sedimentation rate is of relative value in prognosis, but it may be useful for making a differential diagnosis in certain cases [See also this *Bulletin*, 1949, v 46, 45] H J O D Burke Gaffney

SCHOENBACH, E B Aureomycin Therapy of Recrudescant Epidemic Typhus (Brill's Disease) *J Amer Med Ass* 1949, Feb 12, v 139, No 7, 450-52, 1 chart

"A 42 year old Rumanian born man, ill with recrudescant epidemic typhus (Brill's disease), was treated on the sixth day of disease with aureomycin by oral and intramuscular routes. Prompt clinical improvement was observed. This is the first case of Brill's disease with a serologic pattern consistent with recrudescant epidemic typhus to be reported in Baltimore "

GIROUD, P & CIACCIO, G Valeur antigène et pathogène des précipitats de poulmon de lapin infecté de rickettsies épidémiques et murines par l'alcool méthylique [The Antigenic and Pathogenic Potency of Precipitates, obtained by treating with Methyl Alcohol, of Lung Suspensions of Rabbits infected with Typhus Rickettsiae] *C R Soc Biol* 1948, Oct, v 142, Nos 19/20, 1222-3

Suspensions of rabbit lungs infected with rickettsiae were treated with varying strengths of methyl alcohol and kept for two to seven hours at varying temperatures, the precipitates were separated by centrifugation and then tested by intradermal inoculation of rabbits. The resulting dermal reactions were regarded as showing the degree of virulence of the precipitates, and it was found that when the alcoholic strength was 30-40 per cent the reactions were feeble, although the production of agglutinins in the inoculated animals was almost as great as when untreated suspensions were injected.

This result suggested to the authors that alcohol treatment might be a suitable means of obtaining attenuated living vaccines

- John W D Megaw

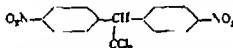
SERGEANT, Ed, PARROT, L & HORRENBERGER, R De la prévention des épidémies de typhus exanthématique par des vaccinations collectives en région d'endémicité pendant les périodes interépidémiques [Prevention of Typhus Epidemics by Mass Inoculation in Endemic Regions in the Inter-Epidemic Periods] *Bull Acad Nat Méd* 1949, v 133, Nos 3/4, 62-3

Epidemic typhus in Algeria is commonly cyclical, occurring in severe "waves" of 3 or 4 years' duration, followed by a subsidence for 8 to 12 years. The authors discuss the epidemiology of this cycle and the need, between the epidemics, to support the resistance of communities in foci liable to become re-attacked.

The non living vaccine of Durand and Giroud is very effective but its protection is short lived. In the face of an epidemic, re-inoculation is desirable every six months. The authors describe a plan for yearly mass inoculation in known epidemic foci of typhus during the post-epidemic period. The vaccine does not give severe reaction but there is the practical difficulty of giving three weekly doses of 1 cc. each to people as scattered as rural Algerians. For this purpose the vaccine has been replaced by one which contains in a single dose of 2 cc. the same number of organisms as there are in the 3 cc. of the three spaced doses of 1 cc. each. The stronger dose seems to be without ill-effect, and thousands of people in these affected areas have in fact already received it, no serious results have been reported. The authors add that, where possible, the course of three spaced weekly doses of 1 cc. each should be adhered to in the case of unusually susceptible persons such as non-immune Algerians, new arrivals from Europe and young children. *H. J. O. D. Burke-Gaffney*

BOCK, MARIANNO & KIKUTHI, W. Zur Frage der chemotherapeutischen Beeinflussung des Fleckfiebers (Chemotherapeutische Action on Typhus). *Alin Woch* 1948 Nov 15. 28 Nov. 43-44 691-4 2 figs.

2,2,2 trichlor 1,1-di-(4-nitrophenyl)-ethane provisionally known as Pb 832, is a new compound with an action on murine typhus. Its structural formula is —



It is insoluble in water but can be suspended in oil or in a commercial preparation Solvent M. Toxicity is low: an oily suspension of 20 mgm. is well tolerated by a mouse of 20 gm. body weight both by the subcutaneous and oral routes. Subcutaneously a dose of 40 mgm. per 20 gm. body weight kills, but a dose of 30 mgm. is not fatal. By mouth a dose of 70 mgm. per 20 gm. body weight kills but 40 mgm. are well tolerated. An oral dose of 2.5 mgm. of the oily suspension daily for five days gives good therapeutic result in mice infected with murine typhus. A daily dose of 2.5 or 5 mgm. for 8 days of the drug in solvent M is curative both subcutaneously and orally. If the rickettsiae are inoculated intranasally the therapeutic action is much less in evidence. The action of Pb 832 is apparently specific for rickettsiae: for the compound has no action on the viruses of influenza, lymphocytic choriomeningitis, louping-ill, and bronchopneumonia of mice or on spirochaetes, spirilla, the larva of rat leprosy, trypanosomes or malaria parasites. *G. M. F. Fuller*

CROSS, H. F. & SVYDER, F. M. Field Tests of Uniforms Impregnated with Mite Toxicants: I. Protection Studies (CROSS & SVYDER). *J. Econom. Entom.* 1948 Dec. v. 41 No. 6, 896-99. Part II. Stopping Time Studies (SVYDER & CROSS). *Ibid.* 940-41.

During the second World War benzyl benzoate was used for impregnating uniforms for protection against mites responsible for scrub typhus infection. In the course of a search for chemical more resistant to washing than benzyl benzoate 6,000 material were subjected to screening test and finally eighteen of them were compared with benzyl benzoate. Of these five were selected which did not stain, cause skin irritation or have an undesirable odour. These were — benzyl benzoic acid, phenyl ester benzoic acid, α -thienyl ester diphenyl carbonat and salicylic acid. α -thienyl ester

Tests were carried out to determine—

(i) The protection given to wearers of uniforms impregnated with test materials at 2 mgm /sq ft of cloth. The evaluation of protection was based on the number of mites attached to subjects wearing these uniforms in heavily infested areas over 1–2 hours. The mites were counted 3–5 hours after exposure and tests were made after the second, third, sixth and other washings of the garments.

Phenyl benzoate, diphenyl carbonate and 2 thenyl salicylate gave 100 per cent protection through seven washings, 2 thenyl benzoate through six washings. Benzyl benzoate gave 99 per cent protection after the third washing, and none after the fourth. With benzil, protection decreased from 99 to 83 per cent after eleven washings.

(ii) The time required to immobilize mites confined to impregnated cloth.

There was found to be a correlation between the time taken for the immobilization of mites and the protection achieved. Substances giving a protection of over 90 per cent caused immobilization of mites in fifteen minutes or less. The intervals between the time the mites first become affected and are finally immobilized increases with the number of washings, this applied to all materials.

C M Harrison

PARKER, R. R., BELL, E. J. & STOENNER, H. G. Q Fever—a Brief Survey of the Problem. *J Amer Vet Med Ass* 1949, Feb & Mar, v 114, Nos 863 & 864, 55–60, 124–30 [61 refs]

NAUCK, E. G. & WEYER, F. Der Erreger der "epidemischen Bronchopneumonie des Menschen" (Herzberg) und seine Beziehung zur *Rickettsia burneti* (Q fever). [The Organism of "Human Epidemic Bronchopneumonia" (Herzberg) and its Relationship to *Rickettsia burneti* (Q Fever)] *Ztschr f Hyg u Infektionskr* 1948, v 128, Nos 5/6, 529–50, 8 figs [30 refs]

The ostensible purpose of this paper is to show that a strain of infection described by HERZBERG in 1946 as the filterable virus of human bronchopneumonia is really the rickettsia of Q fever. The strain, in fact, appears to be the one isolated by Caminopetros in Greece in 1943 and later identified in the U S A as *Rickettsia burneti* by the Commission on Acute Respiratory Diseases [see this *Bulletin*, 1947, v 44, 68].

The authors were severely handicapped in their study of the strain by the fact that no standard strain of *R. burneti* was available for the crucial tests of cross immunity and complement fixation reactions, but the detailed description of the morphology of the rickettsia and of its behaviour in experimental mice, guinea-pigs and various arthropods leaves little room for doubts regarding its identity with *R. burneti*.

A specially interesting feature of the investigation was the intrarectal inoculation of lice and fleas by virulent suspensions, in body-lice rickettsiae were still present in the faeces 24 days after inoculation, but only in small numbers. In the mouse-flea, *Leptopsylla segnis*, growth occurred much more actively. Intracoelomic inoculation of ticks, especially *Ornithodoros moubata*, was very successful, infection persisted up to 282 days and the coxal fluid of the ticks was infective to mice up to 67 days after inoculation. These findings suggested that the tick is likely to be an effective natural vector. The organisms multiplied readily in the fat bodies of the grain weevil, *Tenebrio molitor*. The ease with which development occurred in different arthropods corresponded to similar findings in connexion with *R. prowazeki*, *R. mooseri*, and *R. orientalis*,

and did not suggest that natural transmission was likely to occur by all the arthropods concerned, though it did suggest a close relationship with the rickettsiae of the fevers of the typhus group.

The morphological features of the rickettsiae are fully described and are illustrated by excellent photomicrographs. In average size they appeared to be rather smaller than the rickettsiae of the fevers of the typhus group but otherwise they were similar in all essential respects. The peritoneal cells of inoculated mice were not found to be invaded—the chief concentration of the organisms was in the spleen. No special tendency to invasion of the lung cells was observed even after intranasal inoculation.

The proposal of PHILIP to create a new subgenus, *Coriella* is regarded as premature and agreement is expressed with the present reviewer's comment on Philip's proposal [see this *Bulletin* 1943 v 40 828]. A protest is made against the use of such names as "atypical," "primary atypical, benign, and epidemic" pneumonia—these names are regarded as meaningless and although pneumonic lesions are common they are far from being essential features of the disease.

Full justice cannot be done to the paper in an abstract. If, as seems likely the rickettsia turns out to be *R. boravia* the study will take its place as an important contribution to knowledge of that organism.

John W. D. Meyer

YELLOW FEVER

GARNEHAM P. C. C. Aerodendrophilic Mosquitoes of the Langata Forest, Kenya. *Bull. Entom. Res.* 1949 Mar. v 39 Pt 4 489-90

After a human case of yellow fever had been traced to Langata Forest, near Nairobi Kenya in 1943 it was shown that a mild focus of yellow fever existed there probably the highest in Africa (6000 feet). Observations on forest mosquitoes were begun and later extended to include those in the tree tops.

The numbers are given of the females of eight species of *Aedes* caught on an African child on a platform built in a tree 30 feet from the ground. Catches were made from 7 to 10 a.m. and from 5 to 8 p.m. six times a week from May 1946 to March 1947. *Aedes deorsi* were the most numerous with 28 caught in the mornings and 154 in the evenings. One *Aedes aegypti* was caught. Other platform catches yielded similar results. Simultaneous catches at ground level revealed a wide range of mosquitoes but only nine specimens of *Aedes deorsi* were captured.

Attention is drawn to the following points—the presence of *Aedes aegypti*, the relative abundance of *Aedes deorsi* in the forest but not at ground level, the absence of *Aedes africanus* a known vector and of *Aedes adersi* a suspected vector. The investigation was admittedly on a small scale and in the circumstances it is not possible to say more than that *Aedes deorsi* may be the jungle vector of yellow fever in Langata.

H. S. LARSEN

DICK, G. W. A. & SMITHSON, K. C. Immunity to Yellow Fever Six Years after Vaccination. *Amer. J. Trop. Med.* 1949 Jan. v 29 No 1 57-61

Recently ANDERSON and GAST-CALVIS [see this *Bulletin* 1947 v 44 815] reported that neutralizing antibodies were present in the sera of 83 per cent. of a group of 823 people in Colombia who had been injected with a vaccine made from the 17D strain of yellow fever virus at least five years previously.

The present authors have made a similar observation in Uganda in Central Africa. They found that 91.8, 86.5, 82.8 and 87.4 per cent of four groups injected with the 17D strain of yellow fever virus vaccine still had demonstrable neutralizing antibodies in their serum six years later. Tests of sera from groups of children aged six years or less in each region gave no indication that the yellow fever virus had been present in these areas since the vaccine had been injected. [It is probable that the remaining 17.2-9.2 per cent also have some residual immunity but at a level below the sensitivity of the mouse neutralization test.] These results confirm the validity of the certificate of yellow fever immunity for four years, provided that the required dose of active virus has been injected in the vaccine. The results also agree with those of Anderson and Gast-Galvis in showing no significant difference in the immune response of adults and children. [See also this *Bulletin*, 1943, v 40, 451, 1946, v 43, 34]

F O MacCallum

RABIES

PICKAR, D N & KRAMER, H M. Encephalitis complicating Vaccination for Rabies. Report of a Case treated with Antihistamine Agents. *Southern Med J* 1949, Feb, v 42, No 2, 127-30

In the article under review the authors describe the hitherto untried treatment with antihistamine agents of a case of that very infrequent reaction to antirabies vaccination, encephalomyelitis without paralysis.

The patient, a 26-year-old white man, without history of personal or familial allergic disorders, was admitted to hospital 20 days after having been bitten by a rabid cat. Daily injections of Semple's phenol-killed vaccine were begun some days after the date of biting and were continued over a 10-day period. After the seventh injection the patient noticed swellings at the sites of inoculation, after the tenth injection he became feverish, and suffered progressively increasing frontal headache, somnolence, nausea, vomiting, muscular soreness and diplopia. Thereafter vaccine treatment was discontinued and the patient remained at home in bed for some days, until his condition became so alarming as to necessitate his removal to hospital. On admission he was mentally confused and disorientated, with a temperature of 102°F, there was marked nuchal rigidity, but the Kernig and Brudzinski signs were negative. Neurological examination was otherwise normal. The report of the electro-encephalogram read: "The impression is of a moderately and diffusely slow electro-encephalogram compatible with diffuse encephalopathy." The cell count showed in the cerebrospinal fluid 240 cells per cmm, 89 per cent lymphocytes, 11 per cent polymorphonuclears.

Hospital treatment consisted first in the administration of 500 cc of pooled plasma to ward off the impending circulatory collapse. Antihistamine agents were then exhibited, because of the possibility that the condition might be allergic. 100 mgm of benadryl were given intravenously in 1000 cc of 5 per cent glucose in saline, and 100 mgm were administered by the mouth 4 hours later. Prompt improvement in all symptoms followed, with gradual fall in the temperature to normal within 16 hours. Benadryl was continued in doses of 100 mgm orally 3 times a day until the patient's increasing somnolence compelled its discontinuance after the ninth dose. During the succeeding 24 hours, no antihistamine drug was exhibited and there resulted a temperature rise to 99.6°F, accompanied by return of severe frontal headache and diplopia. Reinstitution of antihistamine treatment with pyribenzamine in doses of 100 mgm 3 times daily caused almost immediate cessation of headache and

return of the temperature to normal. Such pyribenzamine treatment, continued for the next 7 days succeeded in rendering the patient wholly asymptomatic, although the cerebrospinal fluid contained 115 cells per cmm. 94 per cent. of which were lymphocytes. At this time there was marked improvement in the appearance of the electro-encephalogram and 18 days after admission the patient was discharged from hospital afebrile asymptomatic and completely able to walk.

In connexion with this case it is of interest and importance to note that, although without personal or familial history of allergic disorders the patient after intradermal injection of 0.1 cc. of a 1 in 100 dilution of the same material used for his antirabies vaccination developed on the forearm a wheal 1.5 cm. in diameter surrounded by a flare of 6 cm. and that on repetition of the test after 48 hours of pyribenzamine administration in the same dosage as had been used therapeutically, no skin reaction resulted.

Evidence is thereby adduced in favour of the view first advanced by McLENDON at the International Rabies Conference held in Paris in 1927 that anaphylaxis may play a rôle in the causation of the neuro-paralytic accidents of antirabies treatment—a view strongly supported by HORACK (this Bulletin 1939 36 730) and by THOMAS (*ibid* 1943 v. 42, 168).

The authors recommend that inasmuch as recovery followed the use of antihistamine agents in the present case further clinical trial of these drugs should be made in the treatment of the neuro-paralytic accidents of antirabies vaccination.

G. Stuart

VERGE M. J. Meurt-on encore de rage? (Does one still die of Rabies?) *Rev Path Compar* 1948 Dec., No 602, 583-5

The author introduces the subject of his enquiry by stating that deaths from human rabies totalled 151 in the hospitals of Shanghai during the period 1903-48 and 3,000 in the U.S.A. between the years 1903 and 1947. Moreover certain recently published reports challenge the value of anti-rabies treatment and imply that vaccination in man may not be as effective as originally believed. In his defence of Pasteurian treatment however the author refers to the statistical evidence of BATES and LEVINE *vi* that mortality among persons bitten by rabid dogs is from 9.3 to 70 per cent. in the untreated as compared with from 1 to 2 per mille in the treated, and stresses the need, in evaluating the result of anti-rabies treatment, for differentiation between "apparent" and "real" failures of vaccine therapy. Germane to the latter observation is the statistical results quoted from REMPEL and BAILY in respect of the several Anti-Rabies Services in French North Africa. Of 77,453 bitten persons treated, 262 died of rabies—147 being regarded as "apparent failures" 115 as "real failures of treatment." Real failures occurred most frequently among adults and, paradoxically enough, were consequent less on serious wounding than on slight exposures inadequately treated. Apparent failures obtained mostly among children or among persons bitten by wild animal such as wolves and jackals. To these failures the "altered virulence" of certain street viruses also contributed. The conclusion is reached that anti-rabies vaccination remains the sole effective means of combating the invasion of the human body by rabies virus. (The author defines failures of anti-rabies treatment as follows: "apparent" onset of rabies during treatment "real" onset during the weeks or months after treatment. In this connexion it is of interest to recall one of OTTEY's criteria for the drawing up of all rabies statistics on uniform basic principles. Individual treated, as well as deaths, should be classified according to age in view of the fact that experience has generally shown that the mortality is higher among children than it is among adults. Moreover the

method frequently employed, which consists in the suppression of any mention of the total mortality and indicates only the number of failures of treatment or cases in which symptoms developed 15 or more days after the end of treatment, may give a very erroneous impression of the results obtained, because the longer the duration of treatment the greater will be the number of cases of hydrophobia excluded from the "failures" It is therefore logical to use the date of the beginning and not that of the end of treatment from which to reckon the period on the lapse of which the appearance of symptoms implies a failure of treatment, the duration of treatment varying in different institutes This period might, for example, be fixed at 30 days, in accordance with the old custom of applying Pasteur treatment for 16 days, to which 14 days are added to make allowance for the intracerebral incubation period]

G Stuart

PLAGUE

- i KARAMCHANDANI, P V & RAO, K S Streptomycin in Human Plague compared with other Treatments *Lancet* 1949, Jan 15, 96-7, 2 figs
- 11 HILL, A B , BHAGWAT, S Y Streptomycin in Human Plague [Correspondence] *Ibid* Jan 29, 203

1 A group of 15 plague patients, specially selected as being apparently moribund, were treated by streptomycin Only three of them died, and these had been admitted after the 3rd day of the fever in a condition "indicating impending dissolution"

In another group of 32 patients, treatment was by sulphadiazine, combined in some cases with anti-plague serum, there were seven deaths so that there would have been no significant difference between the results of the two methods of treatment but for the fact that three of the patients who had become "apparently moribund" while under treatment by sulphadiazine, were saved by streptomycin, which the authors regard as superior to any other treatment

The dosage adopted was 0.5 gm every six hours, up to a minimum total of 1.0 to 2.0 gm and a maximum of 8.0 gm

11 In a letter to the *Lancet*, Professor Bradford Hill criticizes the authors' presentation of the case for streptomycin and describes it as consisting of pseudo-statistical "evidence" which is calculated to damage rather than further the reputation of the drug In the same letter an attack is made on the validity of the statistics presented by the authors regarding fatality rates among inoculated and uninoculated patients The authors state that among 120 inoculated patients the mortality rate was 27.5 per cent and among 80 uninoculated, 32.5 per cent The authors further state that the mortality rate was "composed of 18 per cent among those who had been inoculated 1-7 days, 4.5 per cent among those inoculated 7-14 days, and 9 per cent among those inoculated 14 days to 4 months before the onset of plague" The latter set of figures does not, as might be supposed, deal with the mortality rates for each of the three sub-groups but appears to have been obtained by dividing the deaths in each sub-group by the total 120 cases, irrespective of the date of inoculation, so that "the resulting figures have no meaning whatever"

In the same number of the *Lancet* Dr S Y Bhagwat also makes a trenchant criticism of the figures dealing with the mortality rates among inoculated and uninoculated patients He points out that if, as stated, immunity develops a week or so after inoculation the patients dying in the first week may rightly be

regarded as uninoculated and the figures will become 11.2 per cent. mortality among 98 inoculated against 46.3 per cent. among 103 uninoculated.

This is only one out of five points of criticism offered by Dr. Bhargava.

John W. D. Moore

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

WESTPHAL, A. Zur Epidemiologie und Pathogenese der Amöbenruhr in Nordafrika 1911/4... [The Epidemiology and Pathogenesis of Amoebic Dysentery in North Africa 1911-43.] *Ztschr. f. Hyg. u. Infektionskr.* 1943, July 16 v. 128 Nos. 1/2 73-86 4 figs.

These important observations were made in North Africa in soldiers of the Africa Corps in 1911-1914. The object was to determine the association between *Entamoeba histolytica* infection and the varied and numerous other intestinal affections encountered in North Africa. An experience in common with other campaigns in this area is that affections of the gastro-intestinal tract vastly outnumbered all other disabilities.

The study is richly illustrated with graphs, diagrams and statistical data which are difficult to summarize and sometimes are more difficult to interpret.

Amongst 1,069 men who were investigated during an average period of 10.4 months in N. Africa up to the autumn of 1914 81 per cent. had experienced one or more intestinal upsets which persisted for longer than three days and comprised every gradation from simple diarrhoea to severe dysentery. There was no apparent correlation between the *E. histolytica* infection and the "intestinal upset index". Even in a particular diagnosed intestinal bacillary infection the individual *E. histolytica* cyst-passers did not suffer more than those who were free from the protozoan. This observation indicated that *E. histolytica* could not be held responsible for the primary disturbance and this was confirmed by experiments made with stool filtrates obtained from *E. histolytica*-negative patients. On these premises it is suspected that in many intestinal disturbances there is a primary bacillary infection rather than a purely functional upset. In no less than 4,057 patients with clinical dysentery on the basis of the clinical picture and the microscopic faecal examination 96.3 per cent. could be diagnosed as primary bacillary and only 3.7 per cent. as amoebic dysentery. But in fact out of the large number (96.3 per cent.) of bacillary infections 7.6 per cent. were found to have a superinfection with lumen-inhabiting forms of *E. histolytica* and 1.4 per cent. could be considered to be suffering from a mixed infection of both bacillary and amoebic dysentery. The total infection-index for *E. histolytica* in these 4,057 dysenteries was no higher than the figures obtained from 981 investigated normal persons. The experience would entirely negate the supposition that this amoeba was responsible for the numerous bowel infections encountered, but rather so the author assures us his figures would support the conclusions deduced from his former self-inflicted experiments in 1937 and 1938 (this Bulletin 1939, v. 25 598 1939 v. 36 288).

From the protocols of several specially meant by investigated cases support has been obtained that a lumen infection with *E. histolytica* arises upon bacillary spoiling of the mucosa. Calculations based upon statistical analysis prove that in about one third of all *E. histolytica* cyst-passers who subsequently contract some bacillary infection of the gastro-intestinal tract the lumen infection develops into the classical *E. histolytica* tissue-invading phase.

P. Mansueto-Bale

VAN STEENIS, P B Enkele opmerkingen over amoebendysenterie en amoebiasis [Observations on Amoebic Dysentery and Amoebiasis] *Nederl Tijdschr v Geneesk* 1949, Jan 1, v 93 (1), No 1, 11-18 English summary (5 lines)

The author reviews our present knowledge of the pathogenesis, clinical course and diagnosis of amoebiasis. The discussion is on familiar lines, except for the interpretation of the life history of *Entamoeba histolytica*, in which the author follows KUENEN and SWELLENGREBEL [see this *Bulletin*, 1914, v 3, 76]. According to this view, in symptomless carriers and in chronic cases of amoebiasis the amoeba lives in the lumen of the gut as a commensal (the so-called *minuta* form) and is responsible for the maintenance of the infection in the same host and for its propagation to others by formation of cysts. Under certain conditions, the nature of which has not yet been clearly established, the amoebae may invade the intestinal wall, producing characteristic lesions and clinical symptoms. The tissue-invading amoebae feed on red blood corpuscles and are larger than the lumen-forms, which show some resemblance to *E coli*. Indirect evidence of the existence of a lumen-dwelling phase of *E histolytica* is provided by the enormous numbers of cysts passed by carriers and chronic sufferers, which are out of all proportion to the small number of tissue-inhabiting amoebae that may be present in lesions, which, according to FAUST [this *Bulletin*, 1941, v 38, 590], are found in all such cases. The present paper is an example of a growing tendency to reconsider our views on the host-parasite relations in amoebiasis, in the light of recent observations on the behaviour of *E histolytica* in cultures and in infections (natural and experimental) of lower mammals [*ibid*, 1948, v 45, 76].

C A Hoare

RITCHIE, L S & DAVIS, C Parasitological Findings and Epidemiological Aspects of Epidemic Amebiasis occurring in Occupants of the Mantetsu Apartment Building, Tokyo, Japan *Amer J Trop Med* 1948, Nov, v 28, No 6, 803-16, 1 fig [11 refs]

This paper reports epidemiological observations and parasitic findings in the Mantetsu apartment building in Tokyo, in January 1947.

The Tokyo water supply had been declared potable. At the time the epidemic was exposed, 73 families of American officials were housed in this building, and a total of 161 persons has been taken into consideration. The arrival dates ranged from 15th November 1946 to 25th January 1947. The rates of protozoan infections in this group prior to their residency in Mantetsu can be little more than speculation and there was no reason to believe that they entered the building with the strikingly high rates they were later proved to have. Although some of the men had spent considerable time overseas, this was not true for the women.

Of the employees, 248 Japanese employed at the building were subjected to multiple stool examinations and were divided into two categories—food handlers and non-food handlers, and on the basis of the control of 15,000 stool examinations on other Japanese Nationals the pre-epidemic protozoan infection rates for the Mantetsu group were estimated to be *E histolytica* 7-10 per cent, *E coli* 15-18 per cent, *Endolimax nana* 10-15 per cent, *Giardia intestinalis* 5-8 per cent and *Chilomastix mesnili*, 1-2 per cent.

Numerous cases of diarrhoea were noted early in January 1947, but the symptoms were so moderate as hardly to attract attention. Out of sixteen stools, half were positive for *E histolytica* (stage not stated). These findings were considered sufficient to warrant the investigation of the water system and dining facilities. The procedure adopted was divided into several phases

Initial examination—The general policy was to examine two or more stools before treatment.

Second phase—If *E. histolytica* had not been diagnosed after 3-5 examinations, the person concerned was examined again twice at weekly intervals and then twice at bi-weekly intervals before being declared free of *E. histolytica*.

Post-treatment examinations were made immediately after treatment and subsequently at intervals of 2, 4, 8 and 12 weeks.

Terminal examinations—Two stools of each occupant were examined at the end of six months. Most diagnoses were made on cysts. When only trophozoites were present the diagnosis was tentative unless typical motility was observed. Saline and iodine direct smears and a microscopic preparation from an ether-sedimentation concentration technique were searched in each specimen submitted.

Adults at the Mantetsu numbered 151 and of these *E. histolytica* was found in 62.9 per cent, while the probable incidence prior to residence in the Mantetsu was estimated to have been 5 to 10 per cent.

One or more protozoa were harboured by 5.4 per cent of the Japanese and the incidence of *E. histolytica* was 22.2 per cent, while *G. subcolonialis* was the most commonly encountered protozoan in both Japanese and Americans.

As in the case of the Chicago hotel epidemic of 1933 [see *Bulletin of Hygiene* 1934 v 9 178-315], no significant difference existed in the susceptibility of the sexes for any of the intestinal protozoa. Among the Japanese the percentage of incidence was approximately the same in those who handled food and in those who did not.

Investigation of the sewage system in the sub-basement revealed a considerable leakage and probable contamination of the water supply. The massive nature of the protozoan infections rendered it unlikely that any agency other than water could have infected so many persons in such a short period of time.

[The large percentage of *E. histolytica* cysts in the faeces combined with apparent absence of acute cases with blood and mucus in the stools would seem to militate against a proven epidemic of amoebiasis.] P. Manson-Bale

DAVIS C. & RITCHIE, L. S. Clinical Manifestations and Treatment of Epidemic Amebiasis occurring in Occupants of the Mantetsu Apartment Building, Tokyo Japan. *Am J Trop Med* 1948, Nov v 28, No 6, 817-23

The clinical manifestations and treatment of one hundred cases of amoebiasis occurring among American occupants of the Mantetsu apartment building [above] are described.

The relative mildness of the clinical manifestation is ascribed to the brief period of exposure to infection with *E. histolytica*. Fully 45 per cent. gave no history of gastro-intestinal complaints since arriving in Japan. Diarrhoea was the most commonly reported finding and approximately 40 per cent. of patients noted one or more episodes of 2-4 days duration of only "3 loose stools per day". Approximately 28 per cent. averaged 4-8 stools per 1 hour and only 7 per cent. averaged 8-15 stools during the same period. A few rice-water stools were submitted. No microscopic or macroscopic blood was recognized in any of the stools. Practically all patients noted acute bloating, epigastric discomfort and varying degrees of lower abdominal discomfort after meals and approximately 10 per cent. reported anorexia and vomiting. There were no fatalities.

Seventy-4 of the patients were treated with carbarosone 0.3 gm. three times daily for 7 days followed by diiodoquin 0.63 gm. three times daily for 7 days. The remainder were given emetine hydrochloride 0.03 gm. intramuscularly.

twice daily for 7 days concurrently with carbarsone and diodoquin as above, they were those with more severe diarrhoea

Of the total number treated, three continued to pass cysts of *E histolytica* after one course of treatment, two of these had negative stools after a second course, while one child required four courses before the stools were found to be negative. Seventeen patients continued to have occasional episodes of mild diarrhoea or abdominal cramps in spite of repeated post-treatment negative stools

[The absence of blood and mucus from the faeces even in the more acute cases strengthens the view already expressed above] P Manson-Bahr

SENECA, H, HENDERSON, E & HARVEY, Martha The Synergistic Action of Penicillin and Streptomycin on *Endameba histolytica* Cultures Amer J Trop Med 1949, Jan, v 29, No 1, 37-9

"Neither penicillin nor streptomycin is amebicidal in concentrations of 100 to 1,000 units per cc. A combination of the two, however, in equal unitage, kills amebae in the first generation at a total concentration of 2,000 units per cc, and in the second generation at 1,000 units per cc. The latter concentration is found not to be bactericidal, hence the action is probably a direct one rather than an elimination of necessary bacterial products. Therapeutic application of the findings is suggested"

SENECA, H, HENDERSON, E & HARVEY, Martha Effect of Hyaluronidase and of Hyaluronic Acid on Cultures of Trypanosomes, Leishmania, and Amoebae Science 1948, Dec 24, 714-15

Hyaluronic acid is a complex polysaccharide which with its enzyme, hyaluronidase, is found in bacteria and animal species. The effect of these substances was tested on cultures of *Leishmania donovani*, *Trypanosoma cruzi*, and *Entamoeba histolytica*. The flagellates were unaffected both by direct treatment and after numerous subcultures in media containing these substances. In the presence of the enzyme, *E histolytica* became hyperactive with enhancement of growth, the acid, however, had a contrary effect, a dosage of 5 mgm per 5 cc sterilizing cultures after three generations.

It is suggested that hyaluronic acid might be usefully employed in the treatment of cases of amoebic dysentery (a) for its direct action on the organism, and (b) to inhibit the stimulatory effect of hyaluronidase. P C C Garnham

COUTELEN, F, BIGUET J & COCHET, G Hématophagie expérimentale de *Trichomonas natricis*. Le pouvoir hématophage constitue-t-il un test de pathogénicité chez les trichomonades parasites intestinaux. [Experimental Haematophagy in *Trichomonas natricis* and its Possible Significance as a Test for Pathogenicity in Parasitic Intestinal Parasites.] Bull Soc Path Exot 1948, v 41, Nos 11/12, 657-60 [13 refs]

YAWS

HARDING, R D A Yaws Campaign in Sierra Leone Trans Roy Soc Trop Med & Hyg 1949, Jan, v 42, No 4, 347-66, 1 map [12 refs]

This campaign was carried out among a primitive peasant population of 276,000 in eastern Sierra Leone. Practically the whole population was examined and all active yaws cases were treated. The vegetation of the area is discussed.

It is about 400 feet above sea level and swamps are numerous. The rainfall is 80-95 inches and is heaviest in June to October when humidity is high.

The prevalence of yaws is undoubtedly correlated with social status and with hygiene. Secondary yaws lesions were most frequent during the wet season and least in the dry season. This must be taken into account in assessing the significance of changes in the incidence found at surveys after treatment at different seasons. Monthly examinations for one year of a population of 1400 in a place where insufficient treatment was given to affect the general picture showed that infectious lesions might be four times and non-infectious lesions over twice as frequent in the wet as in the dry season. About two-thirds of the whole population aged 10 years or over had been infected. At any one time up to 13 per cent. of infectious yaws lesions were found in some communities examined in the wet season. Non-infectious yaws included dry secondary lesions palmar and plantar keratosis, bone and all tertiary lesions. The author comments that late secondary non-infectious plantar lesions appeared to be much more frequent than in most parts of the world and in some areas comprised 80-90 per cent. of all yaws lesions. These lesions are aggravated by trauma and peasant occupations. (Plantar and palmar lesions urgently need thorough study. Their economic significance is rarely appreciated. The high incidence of these lesions in people aged 20-30 years compared with that of the remainder of the population, suggests that many may be tertiary lesions.)

A valuable table of the incidence of various yaws lesions in different age groups in a community of 4,500 shows that primary and secondary framboesiomata occurred chiefly in those under 10 years of age granulomatous plantar yaws were present equally frequently in the age groups 5-9 and 10-19 while non-infectious lesions were more frequent in those aged 20-30. This suggests a natural evolution of yaws. After 40 years of age yaws lesions gradually disappeared. This incidence is important in control in that attention should be concentrated on the younger sections of a community.

There was no evidence that any insects assist in transmission. Probably the most important factors in the spread of yaws are the crowding of naked children in hot humid, dirty mud huts and the absence of personal cleanliness. In Sierra Leone yaws is a house disease spread by direct contact.

The author discusses the organization of the campaign and stresses the long quiescent periods in the secondary stage which may end the infectious relapses. The essentials in order of time are (1) mass diagnosis and treatment (2) provision of permanent treatment centres placed so that no patient need travel more than 10-12 miles and (3) the establishment of itinerant yaws attendants who seek patients and send them to the nearest treatment centres. Treatment was given at intervals of 5 days to fit in with a campaign against trypanosomiasis.

The drugs at first used were acetylarsan (diethylamine acetarsol D.A.) and bismuth sodium potassium tartrate both given by intramuscular injection. At an early stage acetylarsan 5 cc (1.13 grammes D.A.) was found too toxic and the dose was finally reduced to 2.5 cc. (0.59 grammes D.A.) for 4 injections. The B.S.P.T., 5 grains (0.33 grammes) was found relatively ineffective and was finally replaced by bismuth salicylate 0.5 grammes in oil. The doses quoted are for body weight of 125 lb. (57 kilo) or more. Four to six injections of acetylarsan and B.S.P.T. (or acetylarsan and bismuth salicylate) were given concurrently. It was later learned that the B.S.P.T. (Dr Alexander's formula) contained only 4.34 per cent. bismuth metal while the bismuth salicylate B.P., contained about 58 per cent.

The clinical and serological results which have already been published by ARTED *et al* [this Bulletin 1948 v. 43 1066] showed that of infectious lesions

one year after treatment 64 per cent were free of lesions, 32 per cent had inactive plantar lesions and 4 per cent had active yaws. For non-infectious lesions, the corresponding figures were 34.2, 50.9 and 14.7 per cent. Of 250 cases 6 months to 2½ years after treatment with acetylarsan and B S P T, 29.2 per cent gave negative Kahn reactions and 32.8 per cent gave + weak or ± reactions.

After mass diagnosis and treatment alone there was some reduction of infectious yaws. When this was followed by permanent treatment facilities, the yaws incidence fell from 4-6 per cent to under 1 per cent in several years. When home visiting was also added, no infectious yaws was found in a sample of 1,500 of 7,000 people about 15 months after initial mass treatment, however, 8 months after all treatment facilities had been withdrawn the incidence had risen to half its original level. Non-infectious lesions decreased more slowly than infectious lesions.

The author discusses the theoretical aims of a yaws campaign as (1) total eradication of yaws, (2) elimination of infectious yaws, (3) reduction to a level that produces no serious suffering or inefficiency, (4) alleviation of symptoms by treating those who voluntarily seek attention. Since the correction of unhygienic conditions is at present impracticable, chemotherapy must remain the chief weapon in West Africa. Movements of individuals make complete eradication impossible. The author's opinion is that complete eradication is not without the danger of being followed by a big increase in syphilis. The marked tendency of relapse in the secondary stage makes elimination of infectious lesions more complicated than might appear. The reduction of yaws to a low endemic level became the purpose of the campaign reported, and this was achieved. Although treatment of patients presenting themselves does reduce the incidence of yaws, it is not very effective and is relatively expensive.

In conclusion the author says the most practical method of controlling yaws was (1) mass diagnosis and treatment, (2) followed immediately by permanent treatment dispensaries, (3) home visits by a yaws attendant. He regards the second as the most important, but previous mass treatment is essential to reduce the amount of yaws and to accustom the people to the necessity of adequate treatment. At the most successful dispensaries, with the aid of the local chief, 80-90 per cent of patients attended for 6 injections.

[This is an important paper and reports purposeful and careful work. It provides answers for most of the questions that should be considered before a yaws campaign is started. The expense, based upon existing costs, could be worked out from the data given.]

C J Hackell

REIN, C R, STERNBERG, T H, DWINELLE, J H & SHELDON, A J. Penicillin Therapy of Yaws and Serologic Results. *Arch Dermat & Syph* 1948, June, v 57, No 6, 942-51. [Refs in footnotes]

The material upon which this paper is based has been previously reported by DWINELLE *et al* [*this Bulletin*, 1948, v 45, 87]. The results of treatment in primary and secondary yaws in Haiti are considered from the results of Kahn reactions one year after treatment with 1,200,000 units of penicillin in watery solution or in arachis oil and wax.

The authors discuss the factors concerned in the reversal of positive serological tests in yaws as in syphilis. They are the stage of the disease, personal factors, initial serological titre, the sensitivity of serological technique, test used and treatment received. They say 'the serological response in yaws is

certainly much slower and less satisfactory than that observed in the treatment of early syphilis with a similar amount of penicillin." This may be due to the longer duration of the infections and the shorter period of observation in their patients.

Serological Results & Percentages

Treatment	Cure	Improvement	Relapse	Fastness	Cure and Improvement	Numbers of patients
In water in 4 days	23.1	68.7	4.8	1.5	93.8	200
In oil and wax in 2 days	11.0	81.9	5.5	1.5	92.4	151
In oil and wax in 1 day	6.4	83.4	4.8	2.4	92.8	149

The above table shows that more serological cures followed the longer course of treatment. Over 90 per cent. of cases had remained non-infectious (cure and improvement) throughout the year. [In the earlier paper referred to above it will be seen that clinical relapses are much fewer than serological relapses.]

The authors regard penicillin as probably the drug of choice in the treatment of yaws in the field as the course can be short, clinical results are good and serious untoward effects are absent.

In the discussion they report that therapeutic trials are being carried out in Haiti with 1,200,000 and 2,400,000 units of crystalline penicillin G in arachis oil and wax in 2 and 4-day ambulatory courses.

C. J. Hackett

LEPROSY

IGNACIO CHALA H., J. Investigaciones terapéuticas en la lepra. Ensayos con Promin o Promanada. [The Treatment of Leprosy. Trial of Promin.] *Rev. Facul. de Med. Bogotá*, 1948 Oct. v. 17 No. 4: 121-59, 18 figs. English summary.

At the Lleras Acosta Institute Promin (or Promanada) has been tried for periods ranging between 7 months and 1 year and 8 months on 27 suffers from leprosy, only one of whom had had any previous treatment. Nineteen were of the lepromatous type, 7 the tuberculoid, and 6 the neuromatous type. The drug was given intravenously in doses of 2.5-3 gm. daily or on alternate days according to the general physique and condition of the patient. Frequent examinations of the blood were made but only slight changes were observed. Leprous reaction might occur during the course of treatment but disappeared if the drug was stopped and benadryl administered.

In the lepromatous patients improvement of the mucous and cutaneous lesions was observed in 58.25 per cent. [11 of the 19?] in the neuromatous type in 33.3 per cent. [presumably two patients] but none with peripheral nerve disturbance showed any benefit. The results generally were better in those in an early stage but before arriving the results it will be necessary to observe the patients for a long period and a real jumping to conclusion from early benefit in a few patients. Clinical details are given of all 27 patients and illustrations showing the condition before and after treatment.

H. H. Reid Scott

CHATTERJEE, S N Injection of Sulphetrone and Diasone in Leprosy a Preliminary Study *Internat Med Abstracts & Reviews* Calcutta 1949, Jan, v 5, No 1, 13-15

"1 Results of injecting sulphetrone and diasone, in small doses, in 17 cases are reported. A maximum of 5 cc of a 3.3 per cent solution has been used.

"2 Small doses of the drugs by injection, although not producing any appreciable blood level of the drug, produced clinical improvement without producing anemia.

"3 This method of treatment is considered more economical and safe than when the sulphone drugs are administered by mouth.

"4 It is suggested that more extensive trials should be undertaken to find out the minimum dose which will give satisfactory clinical and bacteriological results, without producing anemia or any other toxic symptoms."

HELMINTHIASIS

BARLOW, C H & MELENEY, H E A Voluntary Infection with *Schistosoma haematobium* *Amer J Trop Med* 1949, Jan, v 29, No 1, 79-87, 3 figs

There is no previous report of a voluntary human infection with *Schistosoma haematobium*. The senior author applied 8 cercariae of *S. haematobium* from 8 different specimens of *Bulinus truncatus* to his left forearm on 31st May 1944 in Egypt. He applied 8 other cercariae from the same snails to the umbilical region on 1st June 1944. On 14th June many cercariae from another 6 snails were applied to the right side of the umbilicus, and the following day some 147 small red papules were seen in this area, these were considered to represent the minimum of cercariae which had penetrated the skin. On 21st June cercariae from 16 snails were similarly applied, on the following day there were 61 more papules. It is therefore estimated that a minimum of 224 cercariae penetrated the skin at the four exposures.

Seventy-six days after the major exposure the temperature rose in the late evening, after slight sweating it had returned to normal by the following morning. Slight daily fever then persisted over several weeks without significant increase in severity. On the 77th day spermatozoa were seen in the urine, and 67 eggs were found in a specimen of seminal fluid. On the 78th day 79 eggs were recovered from a plug of mucus in the stool. On the 106th day eggs appeared in the urine. On the 139th day an itching nodule, half the size of a pea, appeared on the scrotum near the left groin, bloody serum discharged from this contained eggs of *S. haematobium*. Four or five less well-defined nodules were discovered on the scrotum. On the 149th day a nodule in the left groin was excised and found to contain eggs, in the excision wound was found a pair of adult *S. haematobium*. From the middle of the fourth month onwards eggs appeared in increasing numbers in the seminal fluid, faeces and urine, their numbers reached a peak in the seminal fluid at the end of the 6th month, in the faeces at the end of the 10th month, and in the urine between the 8th and 9th months, between 20,000 and 30,000 eggs then being passed daily in the latter.

The symptoms and signs steadily increased until by the 7th month the temperature rose in the evenings to a peak of 39.8 degrees Centigrade, and fell in the early morning after severe sweats to nearly normal. There was general weakness and prostration, blood and mucus appeared regularly in the stools, the urine, which contained blood, pus and shreds of mucosa, was passed frequently with associated tenesmus of the bladder and of the anus.

The patient was now confined to bed and he was unable to sleep without sedatives. By the end of the 7th month the infection had become chronic, the temperature did not rise above 37.6°C. and the general condition improved, the patient becoming ambulatory. The number of eggs in the seminal fluid markedly decreased, they were still numerous in the stools and in the urine, the latter containing up to 30 000 per day and much pus, blood, and shreds of mucus. Repeated differential counts between the 6th and 10th months showed an eosinophilia ranging from 6 to 16 per cent.

Ten months after infection an eight-day intramuscular course of treatment with Fouadin was begun, 47.5 ml. being given. This caused a rise in temperature with nausea and a persistent asthmatic cough. During treatment and for four days afterwards from 3 000 to 8 000 eggs were passed in the night urine; on the 5th day after treatment the number had fallen to 300 and the eggs passed were dead, no miracidia hatched from them after the 5th day. Fifteen days after completion of treatment the night urine contained only 22 eggs and two weeks later the seminal fluid contained only 9. Six weeks after the completion of treatment, and one year after infection, viable eggs again appeared in the urine. Fouadin treatment was again given and continued over a period of 19 days, 67 ml. being given on this occasion. Three months after completion of this second course viable eggs were again found in the urine and these persisted over a period of two months' observation. The patient was then treated with potassium antimony tartrate intravenously on alternate days for 24 days, to a total of 1.5 gm. of the drug. The treatment caused the rather severe side-effects commonly associated with it, but viable eggs ceased to appear after the 15th day of treatment. Urination was frequent and painful after treatment and pus and blood were still present in the urine. The urinary infection was cleared up by sulphonamide treatment. About this time there was evidence of coronary sclerosis and there was impairment of hearing; later signs of prostatic enlargement developed and this was dealt with surgically. Sections of the prostate tissue showed only a benign hypertrophy and no eggs were seen. No further evidence of the worm infestation has been found since the tartar emetic treatment.

The noteworthy features of this carefully observed infection, to which the authors direct attention, were the early appearance of eggs in the seminal fluid, their recovery from the scrotal skin and the demonstration of a pair of worms in a nodule there; the increase in egg production when the infection became chronic, and the failure of Fouadin to eradicate the infection. The hypertrophy of the prostate gland after parasitological cure with tartar emetic is held in part to be due to the previous infection. *A. R. D. Adams*

WATSON, J. M. Studies on Bilharziasis in Iraq. Part I. Present Status of the Subject. *J. Roy. Faculty of Med. of Iraq* 1948, July-Oct. v. 1., Nos. 4-5, 120-34.

The author surveys the information available on the subject of schistosomiasis in Iraq where it is widespread and serious, not only along the middle and lower Euphrates, but throughout the country except in the extreme north, and is likely to spread even more as the irrigation schemes are developed, unless adequate steps are taken to control it. The incidence cannot be stated exactly, but haematuria has been reported in up to 63 per cent of school children and in 100 per cent of patients in surgical ward of one hospital. Eggs have been found in 6 to 74 per cent of specimens of urine examined in various State hospitals. These figures may understate the true incidence.

The snail host, as in Egypt, *Bulinus truncatus* which find a favourable habitat in the shallow irrigation ditches with their weedy and sluggish water.

But there is a marked seasonal variation in the numbers of *B truncatus* found, they disappear in cold weather (November to May) and reappear in large numbers when the annual floods subside. The disease is very prevalent in the rice-field areas, and the snails, therefore, presumably inhabit those waters. No other snail is known to be a host in Iraq.

The author discusses possible campaigns to control the disease, but points out the need for much more detailed information on the ecology of *B truncatus* in Iraq before plans can effectively be made.

Charles Wilcocks

DEWHURST, K. E. The Tribal Distribution of Bilharzia in East Africa. *J Trop Med & Hyg* 1949, Mar, v 52, No 3, 60-61

In 1944, all African troops leaving Kenya for South East Asia were examined for schistosome ova. The author presents the results of examinations of fresh preparations of urinary deposits from members of different tribes in Kenya, Uganda, Tanganyika, Nyasaland and Northern Rhodesia. The total and the tribal results are shown in tables, in which the presence of *S haematobium* ova is recorded as positive and the finding of red cells and debris (but no ova) as "doubtful".

The territorial findings were as follows —

	Kenya	Uganda	Tangan- yika	Nyasa- land	Northern Rhodesia
Total examined	804	788	845	1,059	662
Total positive	10	10	53	158	94
Total doubtful	1	0	7	17	9
Percentage positive	1.2	1.2	6.2	14.9	14.6

The higher percentage of positive findings in the more southerly territories is noteworthy.

The territorial percentages are roughly reproduced in the individual tribal percentages, although the figures for the latter are mostly relatively small (in 22 out of 32 tribes the total number of men was less than 100). There was, however, some variation. It is noted, for example, that in Kenya, all 10 positive results came from 101 members of the Jalu tribe, in Tanganyika, the Makua and Mkwana (80 men each) showed 15 and 10 positives, respectively, in Nyasaland, 41 of 168 (24 per cent) Jao were positive and in N Rhodesia 25 of 76 (39 per cent) Chewa and 23 of 45 (51 per cent) Tumbuka. The other tribal percentages were fairly close to the averages for the territories to which the tribes belonged.

The author considers that the results give a rough estimate of the distribution of schistosomiasis in East Africa, but adds that it is somewhat conservative, since the subjects examined were young "healthy" Africans passed fit for military service.

H. J. O'D. Burke-Gaffney

BENNIE, I. R. Urinary Schistosomiasis: the Best Time to obtain Specimens, the Effect of Specific Therapy on Egg Output. *South African Med J* 1949, Feb 5, v 23, No 6, 97-100, 1 fig.

The excretion of eggs even in active *Schistosoma haematobium* infections is notoriously irregular. One hundred and twenty-eight African school children were found to be suffering from active urinary schistosomiasis on a single urine examination in November 1947; they were similarly re-examined in July 1948.

No specific treatment had been given but at the second examination only 95 (74.2 per cent.) were passing eggs. There have been various explanations for the irregular egg output and fluctuations in their numbers in the urine. In clinical practice it is usual to examine the terminal urine from the first emptying of the bladder on rising in the morning in the belief that eggs pass into the urine from the bladder during the night and their number is increased by distension of the bladder. Specimen of urine from a young male African suffering from *S. haematobium* infection, employed on domestic duties were subjected to carefully controlled egg counts each morning and afternoon for a month. From close observation of this patient it appeared that the number of eggs passed in the urine was closely related to the amount of physical exertion just before micturition, particularly if the exercise involved movement of the musculature of the lower abdomen. Examination of the early morning urine in this patient might well have failed to reveal the presence of urinary schistosomiasis but examination of the afternoon specimens invariably yielded eggs. The common practice of examining terminal urine from an early morning specimen should therefore be abandoned as reliance cannot be placed on examinations of urine from patients who are recumbent. Indeed, it is desirable to get patients to undertake exercise before passing urine when searching for schistosome eggs.

This same patient was treated with a single dose of Miracid D by the mouth daily for six consecutive days. The daily dosage ranged from 1 to 1.5 gm. and the total was 171.6 mgm. per kgm. On the second day the average output of eggs in the morning specimen rose, and there was a fall in that of the afternoon specimens. This was possibly due to the fact that the patient rested throughout the treatment but the increased morning output it is suggested may have been due to stimulation of the worms by Miracid D. The number of eggs in both specimens rapidly diminished thereafter and nine days after completion of treatment there were only a few blackened and calcified ova in the urine.

Toxic side-effects were loss of appetite, slight abdominal pain, severe headache and epistaxis, dizziness and weakness. These rapidly disappeared after completion of the treatment. There was some yellow staining of the skin of the palms and of the soles for about a week. A. R. D. Adams

BLAIR D. M. LOWTRIDGE F. G. MEESER C. V. & ROSS W. F. Urinary Schistosomiasis treated with Miracid D. *Lancet* 1949 Feb. 26 341-6

BLAIR *et al.* (1947) [this Bulletin 1948 v 45 526] have already recorded the disappointing therapeutic results of treatment of *S. haematobium* and *S. mansoni* infections in man with Miracid D given for two or three weeks in a daily dosage up to 4 mgm. per kgm. of body weight. Subsequently they found that a bigger daily dosage for a shorter period was effective in curing *S. haematobium* infections. They now report the results of oral treatment with Miracid D of 82 African children suffering from *S. haematobium* or *S. haematobium* and *S. mansoni* infections in Salisbury, S. Rhodesia. Daily doses of 15 mgm., 20 mgm. or 25 mgm. per kgm. of body weight were given by the mouth, the full amount, to the nearest 200 mgm. tablet was spread over five days in ten doses. The early results with the lower two dosages were so promising that the highest was later abandoned. All the children were re-examined over a period of twelve weeks after the completion of treatment. The results of treatment are set forth in a table. From this it is evident that of 53 children suffering from *S. haematobium* infection who completed the five-day treatment 47 were cured, that is no eggs whatsoever were found over the twelve-weeks period of observation and no active miracidia were found in the urine during this period. Four of the 53 were not cured in the

case of the remaining seven a few dead eggs were found. Twenty-nine other children, who were similarly affected, received the treatment over a period which approximated to the five-day course. The results of treatment in these cases were very similar. There were toxic side-effects in about half the children, these consisted of abdominal pain, loss of appetite, nausea, headache and dizziness, none was severe enough to cause a child to seek medical aid. As the lowest dose, 15 mgm per kgm daily, produced results at least as satisfactory in eradicating *S. haematobium* infections as the two higher dosages, there appears to be no purpose in exceeding it. Of 15 patients passing *S. mansoni* eggs in the stools, 13 were passing *S. haematobium* eggs in the urine, all 13 were cured of their *haematobium* infections by the course, but only 2 of the patients in this group ceased to pass *mansoni* eggs. Of the two patients with pure *mansoni* infections one was cured but the other was not. Thus of 15 patients with *S. mansoni* infection only 3 were cured, and this parasite would appear to be much more resistant than *S. haematobium* to Miracid D. The drug is expensive by African standards, the cost being about 8 shillings per patient, its advantages are that it can be given orally, and to ambulatory patients without skilled assistance or expensive equipment. [In a later note, in the *Lancet* of 12th March, Blair adds that of 74 children shewn to have been cured, after a 3-months follow-up, 51 have now been re-examined after 6 months. Of these, 1 is now passing live eggs, 12 are still passing blackened dead eggs and the remainder are not passing any eggs.] A R D Adams

RAIL, G A Intensive Treatment of Schistosomiasis with Sodium Antimonytartrate [Correspondence] *Lancet* 1949, Mar 26, 548

The author, writing from Gatooma, S Rhodesia, refers to the work of ALVES, ALVES and BLAIR and of GIRGIS AZIZ on the intensive treatment of schistosomiasis with antimony [this *Bulletin*, 1945, v 42, 815, 1946, v 43, 344, 752, 1948, v 45, 446]

He has treated 20 patients with a 30-hour course of sodium antimonyl tartrate in a dosage of 1 gram per 12 lb of body weight in six intravenous injections. In the first 6 cases, each dose was diluted in 10 ml of glucose saline, but later this was replaced by sterile water. Not less than 5 minutes was taken over each injection, the time being 10 minutes with the heavier doses. Half an hour before each injection, tincture of codeine (B P C) was given in a dose of 1 fluid drachm. This notably reduced irritant effects. The patients were confined to bed during the injections and for 12 hours afterwards. Before and during treatment they were encouraged to take large quantities of glucose. Diet was unrestricted and a high protein intake was encouraged.

In 10 cases in which ova had been found, they were absent six months after treatment. Two of these were negative after 8 months and two after 9 months.

Three patients showed no toxic reactions. 17 had slight headache, lassitude and inertia, but only 2 of them had severe reactions. One of these 2 patients had severe phlebalgia and vomiting during the second injection, and this necessitated splitting of the third injection of $2\frac{1}{2}$ grains into two (1 grain and $1\frac{1}{2}$ grains, respectively). He had no subsequent reactions. The second patient developed a severe conjunctivitis and peeling of the hands three days after completion of the course. These conditions cleared up in 10 days.

Desquamation was also seen in 4 other cases and conjunctivitis in 2. Cough developed in 9 cases, vomiting in 7, fever in 6 and erythema in 1. None of the more serious reactions (jaundice, haemorrhages or cardiac failure) was noted. The minor symptoms disappeared within 14 days, leaving many of the patients feeling better than they had for some years. The author suggests that the toxic effects are not so severe as might have been expected or had been feared by

Schistosomiasis has been reported in 138 *Assays* of some 10 provinces in China the most heavily infected area being round the three big lakes Taihu Tungtinghu and Poyanghu. On the basis of the incidence rate found in a large number of surveys (21 per cent.) an estimate may be made that there are over 5 million cases in China, but the author suspects that this would be an underestimate.

ii. In this paper the authors give a list of snail hosts of *S. japonicum* in China which contains 18 of the 17 named above. They state their reasons based on detailed work, for thinking that for separating these snails into species, a better basis must be found than radular formula, sculpturing or the colour of the shell. They summarize the paper as follows—

One hundred and forty-eight oncomelaniid snails known to be capable of transmitting oriental schistosomiasis which were collected from 7 villages near Soochow Wunsh, Kiangsu China, were subjected to individual observation regarding the number of whorl length and width, number of axial ribs for the last three whorls and denticle count of the radular tooth. It was found that the denticle count varies to such an extent that it is not a dependable criterion for separating species or genus in this group. The same conclusion is suggested for shell characters.

Charles H. Nickels

HOFMANN W. H. & GUTIERA, A. Distoma hepatico originando un absceso prencular [Fasciola hepatica originating in a Nucleo Abscess.] *Rev. Asoc. Med. Trop. y Parasit.* 1949 Jan. Feb., v 5, No. 1/2, 11-12.

Report of a case with the parasite in an abscess of the rectal muscle.

GALLIARD H. Infestation expérimentale par les larves plérocercoides de *Diphylobotrium mansonii* au Tonkin. (Experimental Infection by Plerocercoid Larvae of *Diphylobotrium mansonii* in a Parasit Humaine et Comparée 1948, r 23 Nov. 34 205-13 3 Figs. [17 refs.]

The site of penetration the migrations and the lesions caused by plerocercoid larvae of *D. mansonii* after being swallowed by a number of different experimental animals, were investigated by the author. The larvae used in the experiment were obtained from *Rana tigrina*, *R. limochanis* and *Tropidonotus piscator*.

Rana tigrina—Penetration took place through the stomach wall and was either direct and rapid or involved a resting period between the mucosa and the muscle layer where the larvae remained for as long as 20 days. Subsequently they were found in various internal organs before they ultimately made their way to the muscles. No lesions were produced by the passage of the worms.

Other batrachians and reptiles were also infected with ease but no reaction took place.

Guinea pig—Seven out of eight guinea pigs were successfully infected, and the larvae were found about 18 hours later on the external surface of the stomach wall. Penetration was not direct and there was a strong host tissue reaction in the form of ulceration and congestion. In an infection of 60 days duration the larvae in contact with visceral organs caused inflammatory reactions and adhesions. No intramuscular migration was observed.

Rat.—Twenty (300 hours after ingestion, three larvae were found in two rats in the pancreas, the stomach wall and free in the peritoneal cavity. In a third rat, 90 days after ingestion 25 larvae were recovered, in the stomach wall and on its surface on the liver and spleen and in muscle. No lesions or reactions resulted.

Rabbit.—After 17 hours 3 larvae were found on the stomach wall surface and 2 near the pancreas which caused haemorrhage. Invasion of musculature was observed in a rabbit 30 days after exposure.

Dog—Successful intestinal infections were obtained on feeding dogs with plerocercoids from *Rana tigrina*, from tadpoles of *R. limnocharis* and from *Tropidonotus piscator*, but single plerocercoids from the human eye failed to infect dogs

Cat—Ten plerocercoids were fed to a cat which showed eggs in the stools after 30 days, and after 79 days, 5 worms, 60 cm long, were recovered from the intestine. Another cat fed with 20 larvae produced 8 worms after 28 days

J J C Buckley

LANDELLS, J W Intra-Medullary Cyst of the Spinal Cord due to the Cestode *Multiceps multiceps* in the Coenurus Stage Report of a Case *J Clin Path* 1949, Feb, v 2, No 1, 61-3

A coenurus cyst, larval stage of the taeniid cestode *Multiceps multiceps* was removed from the spinal cord, at the level of the fifth and sixth thoracic segments, of a girl aged 14. She was suffering from spastic paraplegia of acute onset at the level of the sixth thoracic segment which was preceded by "pins and needles in the legs" of increasing intensity. The removal of the coenurus brought no improvement in the paralysis, but a second operation a month later revealed no more cysts nor visible cause for the paralysis. Ten months later there was slight sensory recovery but no motor recovery. The Casoni test was negative and there was no eosinophilia.

Comparative histological study of human brain material which had a similar infestation revealed that there is a natural line of cleavage between the cyst wall and the brain and that there is a reaction area about 3 mm deep in the latter, from the cyst wall outwards. This comprises four zones, of which the third or main zone of cellular infiltration is up to 700 μ in thickness. In the fourth zone there is evidence suggesting severe compression. It is observed that a corresponding zone of chronic granulomatous inflammation in the spinal cord would be of greater functional importance than in the brain and this would explain the non-recovery after removal of the cyst in the present instance.

Further helminthological details on the parasite, the first record of its kind from the human spinal cord, are provided, and illustrated by photomicrographs, [see also CRUZ, this *Bulletin*, 1949, v 46, 65] together with clinical details of another case of human coenurosis in England [*ibid*, 1942, v 39, 631]

J J C Buckley

BENCHIMOL A S Quiste hidatídico de órbita [A Hydatid Cyst of the Eye] *Prensa Méd Argentina* 1948 Nov 19, v 35, No 47, 2241-5, 3 figs [20 refs]

CHAKRABARTY, R Surgical Condition arising out of Impaction of Round Worms in the Intestine *Calcutta Med J* 1948 Nov, v 45, No 11, 420-21
Report of a case

FALLIS, A M *Ascaris lumbricoides* Infection in Guinea Pigs with special reference to Eosinophilia and Resistance *Canadian J Res Sect D Zool Sci* 1948, Oct, v 26, No 5 307-27, 20 figs (5 on 3 pls (2 coloured)) [15 refs]

"Clinical symptoms of *Ascaris* infection were produced in guineapigs by feeding several thousand eggs. Such infections caused a temporary loss in weight and severe congestion of the lungs but no elevation in temperature was observed. An eosinophilia was associated with infection and it reached higher levels following repeated infections. Injections of antigen caused a temporary rise in the number of eosinophiles. Guinea pigs developed a resistance

a result of infection. Some resistance was retained for at least 15 weeks following infection. A slight passive resistance resulted from injections of large quantities of serum from resistant animals and from injections of a liver extract prepared from resistant animals. The resistance was apparent from the amount of congestion in the lungs and the number and size of the larvae recovered from the lungs. The eosinophiles *per se* were not responsible for the resistance observed. It appeared that the body defences, in resistant animals, acted against the parasites before they reached the liver and more especially before they reached the lungs.

BUTTS, D. C. A. La infección filárica en Costa Rica. Contribución del Hospital de La Compañía Bananera de Costa Rica en Limón. [Filaria in Costa Rica.] *Rev. Med. Costa Rica* 1948 May, 3, 8 No. 169 103-8.

The city of Limón has a population between 10,000 and 15,000; the persons examined were distributed in four districts or perhaps we should say the area in which examinations were made was divided into four, namely the Port area, the Hospital zone, Jamaica Town and Cieneguita. Samples of blood were taken between 10 p.m. and 6 a.m., the majority between 10 p.m. and 2 a.m. Altogether 1,308 persons were examined. In Jamaica Town and Cieneguita 1,008 samples were taken from 269 persons and 101 specimens (the number of individuals is not stated) were positive for filarial embryos. Details of the other districts are not given but it is stated that the incidence on the Pacific coast was 1 per cent., that on the Atlantic coast 15 per cent. The age percentage of infestation is given as: Up to 10 years 18, 11-20 years 36, 21-40 years 36, 41-60 years 10 per cent., the youngest was 4 years, the oldest 55 years.

It is stated that the disease was originally imported from Jamaica and the West Indies. (It is not possible to say whether Jamaica was a focus of filaria many years ago but the abstractor while stationed for several years in the island examined many thousands of specimens of blood but found only four cases of filarial infection and all four were imported and were sent back home as soon as possible to avoid infection of others in the island.) The common mosquitoes in Costa Rica are *Aedes aegypti* and *Culex quinquefasciatus* (C. Jahgens) H. Harold Scott

OLIVER-GONZÁLEZ, J. SANTIAGO-STEVENSON, D. & MALONADO, J. F. Treatment of Filaria bancrofti with Hetrazan. Follow-up Observations Fifteen Months after Treatment. *J. Amer. Med. Ass.* 1949 Jan. 29, v. 139 No. 5 308-9.

At the end of 1947 the authors (this Bulletin 1948 v. 45 333) reported on the immediate results of administration of Hetrazan (1-diethyl-carbamyl-4-methylpyrazine) in 25 cases of *F. bancrofti* infection. The large majority of these cases were followed month by month for 15 months.

Of the original 25 patients 23 were seen at the end of 15 months. One patient only had any clinical symptoms during this period that might be attributed to filariae: he had a painful femoral gland and swelling of the upper third of the thigh, which subsided after a week.

Thirteen patients showed no microfilariae at the end of the period and of these 3 had shown microfilariae since the 10th month but only in insignificant numbers (1 to 4). The remaining ten patients showed 30, 19, 14, 11, 4, 4, 3, 1, 1, and 1 microfilariae respectively in 10 cm. of blood; all had lower a much larger number before treatment. These ten patients in whom the infection persisted were those to whom the lowest dosage had been given, although one had received a dosage of 4 mgm. per kgm. 3 times a day for 18 days (total

0.096 gm) the others had less than a total of 0.04 gm. The largest total dose given was 0.132 gm per kgm.

The authors conclude that Hetrazan given in adequate dosage to patients with *W. bancrofti* infection will clear the blood stream of microfilariae for periods of at least 15 months, and that there is no evidence of lymphatic disease that might be attributed to the filaricidal action of the drug. *L. E. Napier*

GORDON, R. M., CHWATT, L. J. & JONES, C. M. The Results of a Preliminary Entomological Survey of Loiasis at Kumba, British Cameroons, together with a Description of the Breeding-Places of the Vector and Suggestions for Future Research and possible Methods of Control. *Ann Trop Med & Parasit* 1948, Dec, v 42, Nos 3/4, 364-76, 1 map & 2 figs on pl.

This is an account of a brief survey of loiasis undertaken in June and July, 1948, at Kumba in the British Cameroons at the request of the Colonial Medical Research Committee.

The population of the township of Kumba consists of some thirty Europeans and about six thousand Africans. The Africans are mainly centred on a ridge 850 feet above sea-level between the rivers Kumba and Meme, the European residential quarters and certain public offices and institutions are set on nearby elevations. Streams run in the valleys between the occupied higher elevations, and the slopes of these valleys, as well as the stream-beds, are thickly overgrown with bush, small tributaries course down the slopes. The streams are generally brisk in flow with rocky bottoms, but in parts the flow is slow and the bottom is sandy with a mud covering overlaid in turn by decaying leaves.

In previous surveys, loiasis infection in the Africans varied from 3.7 to 9.0 per cent of children, and 16.5 to 23 per cent of adults, with microfilariae in the blood, the present survey shows that about 25 per cent of the Europeans had at one time or another shown evidence of infection, some of them being infected within less than twelve months of arrival. On the other hand, microfilariae have seldom been found in African children of less than seven years of age.

Available records and the authors' survey indicate that only *Chrysops silacea* and *C. dimidiata*, both known to be vectors of *Loa loa*, occur in the vicinity of Kumba, and that the former is apparently about 15-24 times more abundant. The observations recorded in this preliminary paper are concerned with *C. silacea* almost exclusively, the specific identity of the *Chrysops* larvae collected is, however, uncertain and requires further confirmation. *Chrysops* was biting from about 8.30 a.m. until after 4.30 p.m., occurring commonly indoors in dwellings at densities of from 0.3 to 1.0 fly per boy hour, the highest catches being in bungalows close to bush. Only female flies were seen despite repeated search in a variety of environments under different conditions for the male, high forest canopy was not examined although suspected as a possible haunt of the male. Man appears to be the chief host, and, probably secondarily, monkey, feeding was observed on the few cattle available, as well as on the usual small animals of the laboratory, there was no visual evidence in fly dissections of blood other than mammalian. Females captured in or near bungalows rarely showed any signs of advanced ovarian development (of 500 examined, 492 possessed immature ovaries or showed only slight development), there is other evidence that the females are not in the vicinity of dwellings in the phase when the ovaries are developing prior to oviposition. All of 19 flies examined particularly showed spermatozoa in the spermatheca.

Chrysops larvae, presumed to be *C. silacea*, were found in the streams but localized to the more stagnant parts and in the mud beneath the decaying

leaves. In the time available little work could be done on the breeding-out of larvae.

Infection rates for presumed *Loa loa* infections in *Chrysops* in three different surveys were 2 positive out of 32, 12.4 per cent positive out of 903 and 7.8 per cent with microfilariae (4.3 per cent. with infective forms) in 480 flies taken in bungalows in the present survey.

It is estimated that a European is liable to infection at least once in five days. The infection rate in Europeans and in Africans is less therefore than might be expected. Three explanations are put forward and briefly discussed. These are as follows:—(1) Infective larvae do not always successfully penetrate into the human skin. (2) Many persons develop an immunity to further infection after earlier unobserved or non-patent infections (this is discounted as unlikely). (3) the absence of microfilariae is due to unisexual infections, failure of worms to mate or chance absence of the microfilariae in the blood on the occasion of the blood film examination. This third point of view is supported not only by studies on animal filariasis but also by histories of Calabar swellings or migrating adult *Loa loa* in persons with negative blood films.

The possibility of control measures is reviewed tentatively.

Chrysops larval control.—There seem to be good prospects of satisfactory if not complete control of the localized breeding places by clearing bush and canalisation, the effectiveness of insecticides should, however, be investigated. The possibility of increased facility for anopheline breeding must be borne in mind.

Protection of the individual—Screening of at least one dayroom per bungalow is suggested. Wide mesh netting soaked in 60 per cent dimethyl phthalate (DMP), if used as for a window-screen is shown to be ineffective as a barrier to *Chrysops*. Flies were effectively repelled for four hours when a 60 per cent DMP preparation ("Liquid Mylol") was applied to exposed skin. "Mylol Cream" containing 30 per cent DMP was ineffective. Clearing of bush from around bungalows seems likely to diminish the fly density in their vicinity.

A final section on future research is not readily summarized and should be consulted in the original. The many aspects of entomology and helminthology mentioned are indicative of our present paucity of knowledge on loiasis. The Kumba area is recommended as an ideal centre for further intensive studies on this disease and its control.

D. S. Bartram

NETTEL F., R. Contribución al estudio de las condiciones naturales de las zonas de oncocercosis en Chiapas. [*Oncocercosis in Chiapas, Mexico.*] *Medicina Mexico* 1949 Jan. 25 v. 29 No. 572 "1 32 7 figs. 16 refs.] English summary

Oncocercosis in South Chiapas is largely confined to the high levels. In one village 1,000 metres above sea-level with only 400 inhabitants, 65 per cent. were infected. Here the rainfall is heavy 320 cm. a year and rain fell on 181 days. At another focus in the north, where the disease is also prevalent though less than in the former, the southern focus the rainfall is 80-160 cm. on 31-60 days in the year.

Captures of Simuliidae were made during one hour in the morning (7-8 a.m.) and one hour in the afternoon (4-5 p.m.) during the wet season (April-September 1946 and 11,657 were caught. Of these 10,294 (88.3 per cent.) were *S. ochraceum* 853 (8.4) *S. calidum* and 378 (3.7) *S. mutabilem*. Though patients come down to the lower levels they do not transmit infection because *S. ochraceum* is not found there.

H. Harold Scott

MAZZOTTI, L Estudio acerca del tratamiento de la oncocercosis [On the Treatment of Onchocerciasis] *Medicina Mexico* 1949, Jan 10, v 29, No 571, 1-5

After a few remarks on the use of the chloride of 1-diethylcarbamyl-4-methylpiperazine, or Hetrazan, in filariasis in general, the author records its use in onchocerciasis. The drug produces more severe reactions in this infestation than it does in infestation by *W bancrofti*, so smaller doses are given, starting with 2 mgm per kilo bodyweight, thrice daily by mouth, and increasing to 4 mgm, but limiting the course to seven days.

He has treated in this way 65 patients and has observed 36 of them during a period of 1-14 months. In all of them there was a diminution in the number of cutaneous embryos found, in some to such a degree that they could be discovered only with difficulty. The adults in the nodules showed an "altered vitality". After 4-8 months in some cases the embryos were again becoming present in larger numbers and it was noticed that these were all in patients with nodules which had not been extirpated.

In the cases of seven patients observed for 6-14 months, five had remained free, and two were showing cutaneous embryos again. The eye symptoms cleared rapidly and the microfilariae disappeared "in a few days". In this regard, of seven patients under observation for 10 months, in one only had the embryos reappeared in the eyes.

H Harold Scott

VARGAS, L Control de la oncocerciasis [Control of Onchocerciasis] *Bol Oficina Sanitaria Panamericana* 1948, Dec, v 27, No 12, 1150-59
English summary

This paper summarizes the principal features of onchocerciasis as it is found in the New World. The author begins by stating the primary requisites for the control of any disease: sufficient funds, organization, enough patients and susceptible people who are interested in the control of the disease and lastly a favourable environment for the work. Control may then be started (a) if the incidence of the disease is sufficiently high, and (b) if there is an appreciable death rate. The incidence of onchocerciasis is not always easy to elucidate and unless similar methods are employed the results of different surveys may not be comparable. The best diagnostic procedure is to observe the following: (1) skin biopsy, (2) eye lesions, (3) allergic phenomenon, (4) eosinophilia. The transmission quotient of onchocerciasis is defined as the proportion of 100 individuals who receive an infecting bite in a given period of time. Evidence of infection is absent in children under 1 year, it becomes manifest in early life and reaches a maximum before maturity.

The three vectors of the disease in Central America are *Simulium ochraceum*, *S callidum* and *S metallicum*. These produce a maximum of 5 generations in the season which lasts from October till the end of March. Anti-larval control by DDT or 'Gammexane' during the dry season is recommended as the best way of getting rid of the disease.

P C C Garnham

DEFICIENCY DISEASES

MAINZER F Menstrual Disorders in Pellagra *Acta Med Scandinavica* 1949, Jan 20, v 132 No 4, 384-91 [46 refs]

Amongst 11 women of childbearing age, suffering from pellagra, menstruation was normal in only one patient. Amenorrhoea was present in 3

by the author as 30 per cent] This fact was used by the author as a rough test for the presence of the "salt" {Apparently he bases his percentage of 17 per cent (*vs supra*) on this test.]

The author injected normal O-group blood into four patients with the disease. The survival time was "about 100 days which is the figure given for their survival in normal recipients. From this he concludes that the increased haemolysis is due to the abnormality of the cells.

Transfusion was the most promising treatment. This had to be repeated frequently. [See this Bulletin 1947 v 44 344] L. E. Nafziger

VENOMS AND ANTIVENENES

GOYAL, R. K. An Investigation into the In Vitro Titration of Cobra and Dabola Antivenins. *Amer J Trop Med* 1948 Sept. v 23 No 5 711-20

The author reports the failure (except in the case of dabola antihæmolysin) of attempts to correlate various *in vitro* titrations of cobra and dabola antivenins with *in vivo* tests. He finds that the neurotoxic fraction of cobra venom is more important than the hæmolysin from which it can be separated by alkalisation of dilute venom. Titration of antivenin was attempted by observing the action of mixtures of neurotoxin plus antivenin on cultures of *Paramecium caudatum* and by certain other tests including flocculation and complement fixation. No satisfactory correlation between *in vitro* and *in vivo* results was obtained, possibly because there is some interaction between the anti hæmolysin and antineurotoxin which interfered with the interaction of the neurotoxin with its corresponding antibodies.

The author's attempts to fractionate dabola venom failed. Fractions containing the hæmolysin were isolated without difficulty but there was no evidence of non hæmolytic toxic fractions. *In vitro* titration of dabola hæmolysin (goat erythrocytes plus egg yolk) gave results roughly parallel to those of *in vivo* tests and the author suggests that such antihæmolysin titrations in the case of dabola antivenin might be used for preliminary tests before final *in vivo* titration is undertaken. B. G. Margrafs

WU, Y. K. & TSI, Y. H. Poisonous Snake Bite. A Report of Four Cases from the Chungking Area. *Chinese Med J* Chengtu Edition. 1945 Apr v 63A No 3 148-51

Four cases of snake-bite are reported, but the snake inflicting the injury was identified in one of them only. It was *Tropidophis mucronatus*. The symptoms in all four patients were very similar both in character and in degree, and this is a common poisonous snake in Szechuan and parts of south-east China so it was probably the cause in others also. In spite of intense local pain—two of the patients were bitten on the foot, one on the leg and one on the hand—extensive swelling of the whole limb, oedema, ecchymosis and blister formation around the site bitten, the systemic disturbance was remarkably slight. This is ascribed to the probability of the mildness of the venom of the snake in this district rather than to the amount of the venom injected being small. Antivenin it is stated, is generally not available in this country and the treatment consisted of the application of tourniquets, one near above the bite and another higher up the limb with loosening for 5 minutes at hourly intervals and incisions and potassium permanganate locally. H. Harold Scott

KOSZALKA, M F Multiple Bee Stings with Hemoglobinuria and Recovery
Report of a Case *Bull U S Army Med Dept* 1949, Mar, v 9, No 3,
212-17 [Refs in footnotes]

"An unusual case of multiple bee stings of all exposed parts of the body, with severe edema, hemoglobinuria and subsequent recovery, is reported. The severity of the injuries and reaction might have been lessened had it been possible to extract the stings immediately after their deposition into the skin, since the sting apparatus when left in the skin continues to force out the contained venom by muscular action. The rapid recovery of this patient is attributed primarily to the parenteral use of calcium gluconate. Calcium salts apparently lessen the phenomenon of transudation, inhibit smooth muscle spasm, and neutralize the toxic effect of the bee venom. Its use, therefore, is suggested in the treatment of stings of bees and other insects where epinephrine has failed to effect a satisfactory response. The newer antihistaminic drugs, not available at the time, are also worthy of trial."

ROMAÑA, C & ABALOS, J W *Latrodectus mactans*, su combate [Control of *Latrodectus mactans*] *An Inst Med Regional Tucuman, Argentina* 1948, Dec, v 2, No 2, 153-61, 2 figs

The English summary appended to the paper is as follows —

"The authors refer to the domiciliary habits of *Latrodectus mactans*, in the Americas and Hawaii, and to the control by physical and biological means

"They refer to their own experiences with different products, and arrive at the conclusion that 'Gammexane' is the most effective toxic for the fight against *Latrodectus*. For a successful control it is sufficient to treat houses and outdoor buildings, which are the places where accidents are more frequent."

DERMATOLOGY AND FUNGUS DISEASES

PIERS, F Sunlight and Skin Cancer in Kenya *Brit J Dermat & Syph* 1948, Oct, v 60, No 10, 319-32, 3 figs [24 refs]

In the author's opinion sunlight is a paramount factor in the causation of cutaneous cancer in Kenya. He distinguishes three types of cutaneous response to prolonged exposure to sunlight:

(1) *Permanent suntan*: the commonest reaction, results in thickening and coarsening of the skin, permanent hyperaemia sometimes occurs and there is usually intensive pigmentation. The pigment is either diffuse or persists in the form of permanent freckles.

(2) *Farmer's skin*, in which the main characteristic is an accentuation of the normal skin folds, particularly at the back of the neck where a system of rhomboid furrows results known as *cutis rhomboidalis nuchae*. Microscopically degeneration of the elastic and collagen fibres of the corium can be seen.

(3) *Chronic solar dermatitis*. This, the most advanced stage of chronic sunburn, results in thinning of the epidermis, patchy pigmentation, telangiectasis and abnormal keratinization indicated by persistent desquamation or the formation of keratoses.

Whereas diffuse changes, as in farmer's skin and permanent sun tan do not favour the development of cancers, the more proliferative localized lesions in chronic solar dermatitis are the immediate forerunners of malignant changes.

the pus and shown to be pathogenic for white mice and a rat but not for guinea-pigs was identified as *Cephalosporium acremonium*. The disease responded to the administration of iodine (intramuscular injection of Lipiodol¹) for three months supplemented by sulphonamide therapy during one week of the period.

As a background to this case (previously noted by COCTELEX & COCRET *C.R. Soc Biol* 1915 v 129 36² and here described in detail) the authors provide a comprehensive and useful survey of the association of species of *Cephalosporium* with pathological conditions in man. The published records are reviewed and tabulated under three heads—mycetomas and other deep-seated infections, superficial cutaneous infections and infection of mucous membranes—and the geographical distribution is noted. Seventeen species of *Cephalosporium* and two of *Hyalosporium* (probably a synonym of *Cephalosporium*) claimed to have been implicated in these conditions are listed. Most of these forms have been inadequately described and are of very doubtful status but *C. acremonium*, the type species of the genus which has been isolated on a number of occasions merits recognition as a human pathogen.

G. C. 4. Smith

MISCELLANEOUS DISEASES

GORDON J. E. & AUGUSTINE D. L. Tropical Environment and Communicable Disease. *Amer J Med Sci* 1948 Sept. v 216 No 3 343-57 [89 refs.]

The general purpose of this essay is to stress the idea that the proper study of disease in hot climates involves study of the host, the parasite (if there is one) and all the other features of the environment. The authors are concerned to show that small environmental variations determine the presence or absence of disease. Of the environmental factors climate is perhaps the most important since it not only exerts a direct effect on man, but it determines the biological environment which is so closely associated with the transmission of disease. But all the environmental factors react on each other and the study of the whole environment is necessary both for the individual patient and for people in the mass. The authors treat the subject on broad lines and point out some of the gaps in our knowledge.

Charles H. Fulcocks

LEÓN L. A. El clima y las enfermedades tropicales del altiplano ecuatoriano. [Climate and Tropical Diseases of the Upper Levels of Ecuador.] *Rev Asoc Med Trop y Parasit* 1919 Jan. I b v 5 Nos. 1/2, 4-8, 4 figs.

Ecuador, a small country on the Pacific Coast of South America, may for descriptive purposes be divided into three zones. Littoral, the inter Andean region (upper level) and the Eastern region. The second of these is the subject of this contribution. It is very mountainous, with interspersed valleys and, consequently with varied temperatures and climate—torrid, temperate and cold. There are parts where the average temperature is from 76° to 20°C., and there may be daily variation up to 15°C.

The diseases of the country are divided by the author into 5 groups: (i) Those met with all over the area, notably smallpox, the enteric fever typhus and infantile paralysis. (ii) Those endemic in the mountains—amœbiasis and helminthic infestations, pediculosis and mycotic skin affections. In this section only of the paper are there any figures of prevalence given. Of 1,743 school-children examined in the towns of Quito, Otavalo and Tulcan

24.29 per cent were passing cysts or trophozoites of *E. histolytica*, as were 28.27 per cent of 902 children in various rural schools. Among urban scholars ascariasis is the commonest helminthic infestation, 30.6 per cent, *Trichuris* in 6.5, *Hymenolepis* in 6.3 per cent. In rural school-children 69.8 per cent had *Ascaris*, 38.5 *Trichuris*, 1 per cent *Taenia* and 0.7 per cent *Hymenolepis*. Common mycotic affections are by *Microsporon audouinii*, *M. lanosum*, *M. album*, *Achorion schoenleinii*, *Trichophyton gypsum*, *T. radiolatum*, *T. meuum* and *Pityriasis versicolor*. (iii) Diseases endemic or epidemic in the northern sector only. *Rabies* has been becoming more frequent since 1942, especially among the Indians who live in close contact with their dogs. *Plague* occurs in outbreaks, especially in the towns of Alausi, Riobamba and Ambato, often preceded by epizootics among hares and guinea-pigs (*Cavia aperea*). *Xenopsylla cheopis* is the chief vector, but *Pulex irritans* also transmits in mountainous districts. Other ectoparasites such as *Ceratophyllus londinensis* and *Leptopsylla musculi* on rats and mice, and *Rhopalosylla cavicola* and *Hectopsylla suarezi* on guinea-pigs, it is said, play no part in plague transmission. (iv) Endemic diseases in the valleys are *bartonellosis*, *pinta* (in four foci, the valleys of Chillos, Yunguilla, Catamayo and Malacatos), *leprosy*, *malaria* with *A. pseudo-punctipennis* as the chief vector, but *A. albimanus* is also present. A few cases of *balantidiosis* are seen. (v) Sporadic diseases. Cases have been reported of *bacillary dysentery*, *brucellosis*, *Weil's disease*, *filariasis*, *echinococcus*, *Dipylidium* infestation, intestinal *coccidiosis*, cervicofacial *actinomycosis* and *chromoblastomycosis*.

Other diseases are mentioned as occurring in other parts of Ecuador, but not in the district which is the subject of this paper. These are dengue, relapsing fever, Chagas's disease, yaws, hookworm and maduromycosis. [Unfortunately no figures of incidence are given except for the few mentioned in group ii.]

H. Harold Scott

GELFAND, M. A Few of the Rarer Diseases seen in Africa. *East African Med J* 1948, Dec., v 25, No 12, 447-53

Onyala is the African name given to a peculiar bleeding disease first described in Angola in 1904. It was reported in Southern Rhodesia, where it is common, by MORRIS in 1926 and later by BLACKIE [this *Bulletin*, 1938, v 35, 74], who showed that the condition was associated with a marked thrombocytopenia. Gilkes in 1934 gave an accurate account of the disease in Northern Rhodesia [*ibid.*, 1934, v 31, 751]. A number of workers (including Morris) have found that intramuscular injection of blood from any healthy adult stopped the bleeding, but blood transfusion may be necessary in severe cases. Vitamin K has been given with poor results.

The disease is usually found in an area extending from Broken Hill in the North to Angola in the West, to the eastern boundary of Southern Rhodesia (Nyasaland practically escaping) and southwards to the Transvaal and Bechuanaland. It has occasionally been reported as common in East and West Africa and the Congo. There is no evidence of any toxic factor in the diet or in remedies given by witch doctors or herbalists. The disease is most common in adult males, but is found at all ages and in females.

The characteristic lesion distinguishing *onyala* from Werlhof's purpura (essential thrombocytopenia) appears to be the blood blister. The illness starts abruptly, the first symptom usually being bleeding from the mouth or nose, which may be mild or severe. Sooner or later bleeding occurs into the urinary tract, not uncommonly into the bowel, and in females into the vagina. Typically a blister varying from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch in diameter is found anywhere on the mucosa of the lips, oral cavity, tongue or pharynx, such blisters are

the pus and shown to be pathogenic for white mice and a rat but not for guinea-pigs was identified as *Cephalosporium acremonium*. The disease responded to the administration of iodine (intramuscular injection of "Lipiodol") for three months supplemented by sulphonamide therapy during one week of the period.

As a background to this case (previously noted by COUTELLE & COCHET C.R. Soc. Biol. 1945 v 129 392, and here described in detail) the authors provide a comprehensive and useful survey of the association of species of *Cephalosporium* with pathological conditions in man. The published records are reviewed and tabulated under three heads: mycetomas and other deep-seated infections; superficial cutaneous infections; and infection of mucous membranes—and the geographical distribution is noted. Seventeen species of *Cephalosporium* and two of *Hyalospor* (probably a synonym of *Cephalosporium*) claimed to have been implicated in these conditions are listed. Most of these forms have been inadequately described and are of very doubtful status but *C. acremonium*, the type species of the genus which has been isolated on a number of occasions merits recognition as a human pathogen.

G. C. Ainsworth

MISCELLANEOUS DISEASES

GORDON J. E. & AUGUSTINE D. L. Tropical Environment and Communicable Diseases. *Amer J Med Sci* 1948 Sept., v 216, No 3 343-57 [93 refs.]

The general purpose of this essay is to stress the idea that the proper study of disease in hot climates involves study of the host, the parasite (if there is one) and all the other features of the environment. The authors are concerned to show that small environmental variations determine the presence or absence of disease. Of the environmental factors climate is perhaps the most important, since it not only exerts a direct effect on man but it determines the biological environment which is so closely associated with the transmission of disease. But all the environmental factors react on each other and the study of the whole environment is necessary both for the individual patient and for people in the mass. The authors treat the subject on broad lines and point out some of the gaps in our knowledge.

Charles W. Fildes

LEÓN L. A. El clima y las enfermedades tropicales del altiplano ecuatoriano (Climate and Tropical Diseases of the Upper Levels of Ecuador). *Rev Asoc Med Trop y Parasit* 1949 Jan. Feb., v 3 Nos. 1/2, 4-8, 4 figs.

Ecuador, a small country on the Pacific Coast of South America, may for descriptive purposes be divided into three zones: Littoral, the inter Andine region (upper level) and the Eastern region. The second of these is the subject of this contribution. It is very mountainous with interspersed valleys and, consequently, with varied temperatures and climate—torrid, temperate and cold. There are parts where the average temperature is from 7-6° to 20°C. and there may be daily variation up to 18°C.

The diseases of the country are divided by the author into 5 groups: (1) Those met with all over the area notably: smallpox, the enteric fevers, typhus and infantile paralysis. (2) Those endemic in the mountains—amobiasis and helminthic infestations, pediculosis and mycotic skin affections. In this section only of the paper are there any figures (prevalence given). Of 1,745 school-children examined in the towns of Quito, Otavalo and Tulcan

between symmetrical gangrene of the extremities and tropical phlebitis? He doubts the latter, as tropical phlebitis is always unilateral to begin with. Treatment is not discussed [See also this *Bulletin*, 1948, v 45, 545]

C F Shelton

GELFAND, M Tropical Primary Phlebitis Thrombophlebitis With some Remarks on its Clinical Features and Treatment *South African Med J* 1949, Feb 19, v 23, No 8, 129-32, 6 figs

In this paper Gelfand carries the study of tropical thrombophlebitis a stage further by suggesting that in addition to the affection of the vein there is spasm of the corresponding artery, and that this is the cause of the oedema which is so striking a feature of the disease. He shows that in pure venous thrombosis there is little or no oedema, no tenderness, little or no fever, and a great liability to embolism. In thrombophlebitis such as has been described in Africans, on the other hand, there is primary inflammation of the vein, with pain, fever, oedema and little tendency to embolism.

On this assumption he has treated five cases (in which the femoral vein was affected) by injection of planocaine into the lumbar sympathetic ganglia of the side corresponding to the inflamed vessel, with the object of eliminating spasm. The results were good. The technique was as follows —

"Ten c.c. of a 2.5% planocaine solution was injected 2 inches from the midline of the affected side towards each of the lower four lumbar vertebrae. A lumbar puncture needle was used. The needle was directed towards the body of each vertebra. On striking the bone, the needle was withdrawn slightly and carried forward into the tissues just beyond the vertebra."

The author thinks that some of the cases of gangrene which have been described in Africans may have been the result of a similar process of arterial spasm.

He records a case of thrombophlebitis of both external jugular veins, in which the oedema of the face resembled that produced by nephritis.

For references to other papers on tropical thrombophlebitis, see the abstract on an earlier paper by Gelfand, above.

Charles Wilcocks

DAVIES, J N P Pathology of Central African Natives Mulago Hospital Post Mortem Studies IX *East African Med J* 1948, Dec, v 25, No 12, 454-67 [26 refs]

This paper in the series [this *Bulletin*, 1948, v 45, 1118, 1949, v 46, 90] deals with cardio-vascular conditions. Congestive heart failure was found 229 times in 3,705 autopsies, which is probably an underestimate. In 5 per cent of these, no adequate cause was found.

Hypertensive renal disease accounted for 31 per cent and aortic syphilis for 20.9 per cent, this being commonest between the ages of 30 and 40 (25 cases) and renal disease between 20 and 30 (23 cases). [In the absence of birth certificates in all cases the ages cannot be quite accurate.] In 2,994 autopsies, evidence of rheumatic carditis was found in only 22 cases, mitral stenosis being present in 21 of these. Subacute bacterial endocarditis was uncommon.

Acute bacterial endocarditis was common and found in 2.5 per cent of all autopsies, the majority of cases arising from a primary septicaemia, the next common cause being pneumonia, and then a *Neisseria* infection. The most common single valve affected was the aortic (35 cases), while the aortic and mitral valves together were involved in 12 instances. In only 3 cases had the valves been previously damaged by rheumatism.

black, and tend to rupture leaving a painful ulcer. The ulcers are often multiple, the tongue enlarges and the parotids may swell. In about a third of the cases the blisters occur on the legs, forearms, hands and occasionally the trunk. Almost always purpuric spots are seen on the conjunctivæ and sometimes on the skin.

The course is usually short, but there is always the risk of a relapse. Some cases are severe from the start and haemorrhage is serious, while in others who are apparently progressing favourably bleeding recurs with increased violence. The most serious type is probably that in which intracranial haemorrhage develops, the patient passing into coma with focal signs and the fluid on lumbar puncture being blood-stained.

Primary splenic abscess was first described by WALLACE at Broken Hill in 1922 (this Bulletin 1922, v 19 816) where there was an outbreak of some 40 cases in a comparatively short time. Although autopsies were performed in a number of cases no common aetiology was found and blood cultures from several patients were negative. Wallace concluded that the abscess was caused by a thrombosis of the splenic vein leading to a liquefactive necrosis of the organ which had become secondarily infected, probably with gas-producing organisms from the bowel. He found that a number of patients had a femoral thrombosis. A tympanitic splenic tumour was very suggestive of the condition. The condition is usually seen in young adults starting abruptly with fever and pain in the left hypochondrium. The swelling rapidly enlarges upwards as well as downwards, raising the left dome of the diaphragm and encroaching on the lung. Dullness may be found at the left base, the signs then closely resembling pneumonia or empyema, while the heart may be rotated upwards and to the right. This condition is best shown radiologically. A tympanitic note over a splenic tumour is very suspicious.

If such a condition is suspected, diagnostic aspiration should be performed at once. The pus is fluid, of a reddish colour, often frothy and sterile on culture. Treatment so far has been by drainage but a discharging sinus persists for many months. Removal of the spleen has not been attempted. There is insufficient evidence to incriminate amoebiasis, emetine has no effect.

This type of abscess is common in the Rhodesias, but so far as the author knows is not met with in East Africa.

Thrombophlebitis or tropical phlebitis has been recently reported in East Africa (this Bulletin 1948, v 43 1186) but was first described in 1911 by FISHER in Northern Rhodesia (this Bulletin 1912, v 39 199). The onset is sudden, usually with high fever, shivering and headache. The duration of the fever usually accompanied by a leucocytosis, varies from a few days to as long as ten weeks, and the patient in severe cases may be seriously ill and delirious. Pain in the affected vein with oedema of the extremities, begins at the start and usually enables a diagnosis to be made. The peripheral veins usually attacked are the femoral—less frequently the subclavian, axillary and external jugular. When the lower limb is involved a permanent swelling of varying degree may persist, but emboli rarely occur.

The prognosis as regards life is good when superficial veins only are involved, but is usually grave when the larger internal ones (e.g. the mesenteric, portal and cavernous sinus) are attacked. In cases of mesenteric occlusion passage of blood *per rectum* is an important sign and the illness may closely simulate dysentery. Pain is usually severe. In thrombophlebitis, in which there is inflammation of the vein with secondary clot formation, oedema is characteristic, and it has been shown that this is due to an arterial spasm occurring simultaneously which disappears rapidly after lumbo-sympathetic block.

The author raises two points—(1) Can primary splenic abscess be included in the same category as tropical phlebitis? (2) Is there any relationship

between symmetrical gangrene of the extremities and tropical phlebitis? He doubts the latter, as tropical phlebitis is always unilateral to begin with. Treatment is not discussed [See also this *Bulletin*, 1948, v 45, 545]

C F Shelton

GELFAND, M Tropical Primary Phlebitis Thrombophlebitis. With some Remarks on its Clinical Features and Treatment *South African Med J* 1949, Feb 19, v 23, No 8, 129-32, 6 figs

In this paper Gelfand carries the study of tropical thrombophlebitis a stage further by suggesting that in addition to the affection of the vein there is spasm of the corresponding artery, and that this is the cause of the oedema which is so striking a feature of the disease. He shows that in pure venous thrombosis there is little or no oedema, no tenderness, little or no fever, and a great liability to embolism. In thrombophlebitis such as has been described in Africans, on the other hand, there is primary inflammation of the vein, with pain, fever, oedema and little tendency to embolism.

On this assumption he has treated five cases (in which the femoral vein was affected) by injection of planocaine into the lumbar sympathetic ganglia of the side corresponding to the inflamed vessel, with the object of eliminating spasm. The results were good. The technique was as follows —

"Ten c.c. of a 2.5% planocaine solution was injected 2 inches from the midline of the affected side towards each of the lower four lumbar vertebrae. A lumbar puncture needle was used. The needle was directed towards the body of each vertebra. On striking the bone, the needle was withdrawn slightly and carried forward into the tissues just beyond the vertebra."

The author thinks that some of the cases of gangrene which have been described in Africans may have been the result of a similar process of arterial spasm.

He records a case of thrombophlebitis of both external jugular veins, in which the oedema of the face resembled that produced by nephritis.

For references to other papers on tropical thrombophlebitis, see the abstract on an earlier paper by Gelfand, above.

Charles Wilcocks

DAVIES J N P Pathology of Central African Natives. Mulago Hospital Post Mortem Studies IX *East African Med J* 1948, Dec, v 25, No 12, 454-67 [26 refs]

This paper in the series [this *Bulletin*, 1948, v 45, 1118, 1949, v 46, 90] deals with cardio-vascular conditions. Congestive heart failure was found 229 times in 3,705 autopsies which is probably an underestimate. In 5 per cent of these, no adequate cause was found.

Hypertensive renal disease accounted for 31 per cent and aortic syphilis for 20.9 per cent, thus being commonest between the ages of 30 and 40 (25 cases). [In the absence of birth certificates in all cases the ages cannot be quite accurate.] In 2,994 autopsies evidence of rheumatic carditis was found in only 22 cases, mitral stenosis being present in 21 of these. Subacute bacterial endocarditis was uncommon and found in 2.5 per cent of all autopsies. The majority of cases arising from a primary septicaemia, the next common cause being pneumonia, and then a *Neisseria* infection. The most common single valve affected was the aortic (35 cases), while the aortic and mitral valves together were involved in 12 instances. In only 3 cases had the valves been previously damaged by rheumatism.

black and tend to rupture leaving a painful ulcer. The ulcers are often multiple: the tongue enlarges and the parotids may swell. In about a third of the cases the blisters occur on the legs, forearms, hands, and occasionally the trunk. Almost always purpuric spots are seen on the conjunctiva and sometimes on the skin.

The course is usually short but there is always the risk of a relapse. Some cases are severe from the start and haemorrhage is serious, while in others who are apparently progressing favourably bleeding recurs with increased violence. The most serious type is probably that in which intracranial haemorrhage develops: the patient passing into coma with focal signs and the fluid on lumbar puncture being blood-stained.

Primary splenic abscess was first described by WALLACE at Broken Hill in 1922 [this *Bulletin* 1922, v 19 616] where there was an outbreak of some 40 cases in a comparatively short time. Although autopsies were performed in a number of cases no common aetiology was found and blood cultures from several patients were negative. Wallace concluded that the abscess was caused by a thrombosis of the splenic vein leading to a liquefactive necrosis of the organ which had become secondarily infected, probably with gas-producing organisms from the bowel. He found that a number of patients had a femoral thrombosis. A tympanitic splenic tumour was very suggestive of the condition. The condition is usually seen in young adults starting abruptly with fever and pain in the left hypochondrium. The swelling rapidly enlarges upwards as well as downwards, raising the left dome of the diaphragm and encroaching on the lung. Dullness may be found at the left base: the signs then closely resembling pneumonia or empyema, while the heart may be rotated upward and to the right: this condition is best shown radiologically. A tympanitic note over a splenic tumour is very suspicious.

If such a condition is suspected, diagnostic aspiration should be performed at once. The pus is fluid, of a reddish colour often frothy and sterile on culture. Treatment so far has been by drainage but a discharging sinus persists for many months. Removal of the spleen has not been attempted. There is insufficient evidence to incriminate amoebiasis: emetine has no effect.

This type of abscess is common in the Rhodesias, but so far as the author knows is not met with in East Africa.

Thrombophlebitis or *tropical phlebitis* has been recently reported in East Africa [this *Bulletin* 1948 v 43 1186] but was first described in 1941 by FISHER in Northern Rhodesia [this *Bulletin* 1941, v 39 199]. The onset is sudden, usually with high fever shivering and headache. The duration of the fever usually accompanied by a leucocytosis varies from a few days to as long as ten weeks, and the patient in severe cases may be seriously ill and delirious. Pain in the affected vein with oedema of the extremities begins at the start and usually enables a diagnosis to be made. The peripheral veins usually attacked are the femoral—less frequently the subclavian, axillary and external jugular. When the lower limb is involved a permanent swelling of varying degree may persist, but emboli rarely occur.

The prognosis as regards life is good when superficial veins only are involved, but is usually grave when the larger internal ones (e.g. the mesenteric, portal and cavernous sinus) are attacked. In cases of mesenteric occlusion passage of blood *per rectum* is an important sign, and the illness may closely simulate dysentery. Pain is usually severe. In thrombophlebitis, in which there is inflammation of the vein with secondary clot formation oedema is characteristic, and it has been shown that this is due to an arterial spasm occurring unilaterally which disappears rapidly after lumbo-sympathetic block.

The author raises two points—(1) Can primary splenic abscess be included in the same category as tropical phlebitis? (2) Is there any relationship

between symmetrical gangrene of the extremities and tropical phlebitis? He doubts the latter, as tropical phlebitis is always unilateral to begin with. Treatment is not discussed [See also this *Bulletin*, 1948, v 45, 545]
C F Shelton

GELFAND, M Tropical Primary Phlebitis Thrombophlebitis With some Remarks on its Clinical Features and Treatment *South African Med J* 1949, Feb 19, v 23, No 8, 129-32, 6 figs

In this paper Gelfand carries the study of tropical thrombophlebitis a stage further by suggesting that in addition to the affection of the vein there is spasm of the corresponding artery, and that this is the cause of the oedema which is so striking a feature of the disease. He shows that in pure venous thrombosis there is little or no oedema, no tenderness, little or no fever, and a great liability to embolism. In thrombophlebitis such as has been described in Africans, on the other hand, there is primary inflammation of the vein, with pain, fever, oedema and little tendency to embolism.

On this assumption he has treated five cases (in which the femoral vein was affected) by injection of planocaine into the lumbar sympathetic ganglia of the side corresponding to the inflamed vessel, with the object of eliminating spasm. The results were good. The technique was as follows —

"Ten c.c. of a 2.5% planocaine solution was injected 2 inches from the midline of the affected side towards each of the lower four lumbar vertebrae. A lumbar puncture needle was used. The needle was directed towards the body of each vertebra. On striking the bone, the needle was withdrawn slightly and carried forward into the tissues just beyond the vertebra."

The author thinks that some of the cases of gangrene which have been described in Africans may have been the result of a similar process of arterial spasm.

He records a case of thrombophlebitis of both external jugular veins, in which the oedema of the face resembled that produced by nephritis.

For references to other papers on tropical thrombophlebitis, see the abstract on an earlier paper by Gelfand, above

Charles Wilcocks

DAVIES, J N P Pathology of Central African Natives *Mulago Hospital Post Mortem Studies IX East African Med J* 1948, Dec, v 25, No 12, 454-67 [26 refs]

This paper in the series [this *Bulletin*, 1948, v 45, 1118, 1949, v 46, 90] deals with cardio-vascular conditions. Congestive heart failure was found 229 times in 3,705 autopsies, which is probably an underestimate. In 5 per cent of these, no adequate cause was found.

Hypertensive renal disease accounted for 31 per cent and aortic syphilis for 20.9 per cent, this being commonest between the ages of 30 and 40 (25 cases) and renal disease between 20 and 30 (23 cases). [In the absence of birth certificates in all cases the ages cannot be quite accurate.] In 2,994 autopsies, evidence of rheumatic carditis was found in only 22 cases, mitral stenosis being present in 21 of these. Subacute bacterial endocarditis was uncommon.

Acute bacterial endocarditis was common and found in 2.5 per cent of all autopsies, the majority of cases arising from a primary septicaemia, the next common cause being pneumonia, and then a *Neisseria* infection. The most common single-valve affected was the aortic (35 cases), while the aortic and mitral valves together were involved in 12 instances. In only 3 cases had the valves been previously damaged by rheumatism.

black, and tend to rupture leaving a painful ulcer. The ulcers are often multiple: the tongue enlarges and the parotids may swell. In about a third of the cases the blisters occur on the legs, forearms, hands, and occasionally the trunk. Almost always purpuric spots are seen on the conjunctiva and sometimes on the skin.

The course is usually short, but there is always the risk of a relapse. Some cases are severe from the start and haemorrhage is serious, while in others who are apparently progressing favourably, bleeding recurs with increased violence. The most serious type is probably that in which intracranial haemorrhage develops, the patient passing into coma with focal signs, and the fluid on lumbar puncture being blood-stained.

Primary splenic abscess was first described by WALLACE at Broken Hill in 1922 [this *Bulletin* 1922, v 19 616] where there was an outbreak of some 40 cases in a comparatively short time. Although autopsies were performed in a number of cases no common aetiology was found and blood cultures from several patients were negative. Wallace concluded that the abscess was caused by a thrombosis of the splenic vein leading to a liquefactive necrosis of the organ which had become secondarily infected, probably with gas-producing organisms from the bowel. He found that a number of patients had a femoral thrombosis. A tympanitic splenic tumour was very suggestive of the condition. The condition is usually seen in young adults starting abruptly with fever and pain in the left hypochondrium. The swelling rapidly enlarges upwards as well as downwards, raising the left dome of the diaphragm and encroaching on the lung. Dullness may be found at the left base: the signs then closely resembling pneumonia or empyema, while the heart may be rotated upwards and to the right. This condition is best shown radiologically. A tympanitic note over a splenic tumour is very suspicious.

If such a condition is suspected, diagnostic aspiration should be performed at once. The pus is fluid, of a reddish colour often frothy, and sterile on culture. Treatment so far has been by drainage but a discharging sinus persists for many months. Removal of the spleen has not been attempted. There is insufficient evidence to incriminate amoebiasis: emetine has no effect.

This type of abscess is common in the Rhodesias but so far as the author knows is not met with in East Africa.

Thrombophlebitis or tropical phlebitis has been recently reported in East Africa [this *Bulletin* 1948 v 45 1186] but was first described in 1941 by FISHER in Northern Rhodesia [this *Bulletin* 1942, v 39 199]. The onset is sudden, usually with high fever, shivering and headache. The duration of the fever usually accompanied by a leucocytosis varies from a few days to as long as ten weeks and the patient in severe cases may be seriously ill and delirious. Pain in the affected vein with oedema of the extremities begins at the start and usually enables diagnosis to be made. The peripheral veins usually attacked are the femoral—less frequently the subclavian, axillary and external jugular. When the lower limb is involved a permanent swelling of varying degree may persist, but emboli rarely occur.

The prognosis as regards life is good when superficial veins only are involved, but is usually grave when the larger internal ones (e.g. the mesenteric, portal and cavernous sinuses) are attacked. In cases of mesenteric occlusion passage of blood per rectum is an important sign and the illness may closely simulate dysentery. Pain is usually severe. In thrombophlebitis, in which there is inflammation of the vein with secondary clot formation, oedema is characteristic, and it has been shown that this is due to an arterial spasm occurring simultaneously which disappears rapidly after lumbo-sympathetic block.

The author raises two points:—(1) Can primary splenic abscess be included in the same category as tropical phlebitis? (2) Is there any relationship

between symmetrical gangrene of the extremities and tropical phlebitis? He doubts the latter, as tropical phlebitis is always unilateral to begin with. Treatment is not discussed [See also this *Bulletin*, 1948, v 45, 545]

C F Shelton

GELFAND, M **Tropical Primary Phlebitis Thrombophlebitis With some Remarks on Its Clinical Features and Treatment** *South African Med J* 1949, Feb 19, v 23, No 8, 129-32, 6 figs

In this paper Gelfand carries the study of tropical thrombophlebitis a stage further by suggesting that in addition to the affection of the vein there is spasm of the corresponding artery, and that this is the cause of the oedema which is so striking a feature of the disease. He shows that in pure venous thrombosis there is little or no oedema, no tenderness, little or no fever, and a great liability to embolism. In thrombophlebitis such as has been described in Africans, on the other hand, there is primary inflammation of the vein, with pain, fever, oedema and little tendency to embolism. On this assumption he has treated five cases (in which the femoral vein was affected) by injection of planocaine into the inflamed vessel, with the object of eliminating spasm. The results were good. The technique was as follows —

"Ten c.c. of a 2.5% planocaine solution was injected 2 inches from the midline of the affected side towards each of the lower four lumbar vertebrae. A lumbar puncture needle was used. The needle was directed towards the body of each vertebra. On striking the bone the needle was withdrawn slightly and carried forward into the tissues just beyond the vertebra."

The author thinks that some of the cases of gangrene which have been described in Africans may have been the result of a similar process of arterial spasm. He records a case of thrombophlebitis of both external jugular veins, in which the oedema of the face resembled that produced by nephritis. For references to other papers on tropical thrombophlebitis, see the abstract in an earlier paper by Gelfand, above.

Charles Wilcocks

DAVIES, J N P **Pathology of Central African Natives** *Mulago Hospital Post Mortem Studies IX* *East African Med J* 1948, Dec, v 25, No 12, 454-67 [26 refs]

This paper in the series [this *Bulletin*, 1948, v 45, 1118, 1949, v 46, 90] deals with cardio-vascular conditions. Congestive heart failure was found 229 times in 3,705 autopsies, which is probably an underestimate. In 5 per cent of these, no adequate cause was found. Hypertensive renal disease accounted for 31 per cent and aortic syphilis for 20.9 per cent, this being commonest between the ages of 30 and 40 (25 cases) and renal disease between 20 and 30 (23 cases). [In the absence of birth certificates in all cases the ages cannot be quite accurate.] In 2,994 autopsies, evidence of rheumatic carditis was found in only 22 cases, mitral stenosis being present in 21 of these. Subacute bacterial endocarditis was uncommon. Acute bacterial endocarditis was common and found in 2.5 per cent of all autopsies, the majority of cases arising from a primary septicaemia. The next common cause being pneumonia, and then a *Neisseria* infection. The most common single valve affected was the aortic (35 cases), while the aortic and mitral valves together were involved in 12 instances. In only 3 cases had the valves been previously damaged by rheumatism.

The only previous reference to the condition known as endocardial fibrosis is by BEDFORD and KONSTAM (*Brit. Heart J.* 1948 v 8 236) who noted it in a number of West African soldiers dying of congestive heart failure. This condition is common at Malaga and typically the lesion consists of fibrosis of the endocardium, often extending deep into the myocardium. The coronary arteries appear normal. The aetiology is obscure. It is not of syphilitic origin and the fibrosis is not usually accompanied by cellular infiltration. These cases show a very chronic type of congestive heart failure: murmurs of valvular incompetence are found, and a pericardial effusion is often present. On opening the heart which is usually dilated, it is found that the endocardium, especially at the apex of the left ventricle is thick and pearly white in colour with strands of fibrous tissue going deep into the myocardium. The fibrosis extends up the ventricular walls and as a result the mitral valve is pulled down and distorted, but the aortic valve is rarely affected. Of the last 43 cases of congestive heart failure seen at autopsy 8 have shown this lesion: these cases having formerly been grouped as syphilitic myocarditis on insufficient evidence. Myocarditis, endocardial necrosis and endocardial fibrosis are important in the pathology of the African but their aetiology is very obscure and they are not usually associated with any of the common cardiac diseases.

Cardiovascular syphilis has been previously dealt with in relation to the problem of syphilis in Uganda (*this Bulletin* 1948, v 45 544). Very little is known about congenital heart disease in Africans.

BECKER in South Africa found that arterio-sclerosis was the direct cause of death in 0.4 per cent. of autopsies. At Malaga minor degrees of atherosclerosis of the aorta were common while in 33 cases out of 2,994 autopsies an advanced degree of this condition was found. Coronary thrombosis was rare in Africans, as was heart failure due to hyperthyroidism.

WILLIAMS (*ibid* 1942, v 39 417 *Bulletin of Hygiene* 1945 v 20 200) concluded that hypertension, both "essential" and renal is common in Uganda but that chronic nephritis and urethral stricture accounted for the majority of cases of high blood pressure. At Kampala, hypertensive disease is the commonest cause of congestive heart failure: hypertrophy due to this condition being very frequent at autopsy. Renal conditions are fully discussed, and it is considered that nephritis and, less commonly renal obstructive lesions are the commonest cause of hypertensive heart failure.

Miscellaneous cardio-vascular lesions including periarteritis nodosa Buerger's disease (thrombo-angiitis obliterans) have been found at autopsy while peripheral gangrene often symmetrical, is sometimes seen. Thrombophlebitis is not uncommon but pulmonary embolism is rare. [Is this because the African usually *likes to stay quiet for long?*] Raynaud's syndrome and cardiac aneurysm have not been met with.

Purulent pericarditis has been described in a previous paper. Pericardial effusions are sometimes seen in cases of endocardial fibrosis. No case of rheumatic pericarditis was seen nor of pericarditis associated with valvular lesions, and in no case with rheumatic valvular lesions was there evidence of past pericarditis. There were 45 instances of tuberculous pericarditis in 429 cases of tuberculous and pericardial disease was found on 105 occasions in 2,994 autopsies.

The commonest valvular lesions seen at autopsy were—aortic val. v 208 cases (syphilitic 167 bacterial endocarditis 35) mitral valve 33 (bacterial endocarditis 13 rheumatism 21).

Degenerative cardio-vascular lesions, atherosclerosis coronary thrombosis and primary hypertension appear less frequent in East than in South Africa, but it must be remembered that the majority of autopsies at Malaga are in patients under 40 years of age and there is no evidence to suggest that in the older African

the incidence of degenerative changes is less than in the European [The expectation of life is less in the former than the latter] In the last two years, two conditions hitherto overlooked, viz, symmetrical gangrene of the extremities [GELEAND, thus *Bulletin*, 1947, v 44, 937] and endocardial fibrosis, have been described
C F Shelton

SOYSA, E The Eosinophilic Respiratory Syndrome A Review of 100 Cases
J Roy Army Med Corps 1949, Jan, v 92, No 1, 1-23, 11 figs [39 refs]

A three-stage clinical course was discernible in the majority of cases included in the investigation, (1) the initial or prodromal stage appeared with malaise, feverishness, and anorexia progressing to febrile coryza accompanied by an occasional dry cough This phase lasted from one week to a month (2) The intermediate or bronchitic stage characterised by an increasingly persistent cough commonly described as irritating, hacking or dry The duration of this stage varied from one month to three years (3) The terminal or asthmatic was the most prominent clinical phase affecting all but three patients in the series This stage varied in duration between the limits of one week and 13 years

More than 50 per cent of the skiagrams examined showed the characteristic shadows associated with this condition The most constant and prominent pathological feature of this syndrome was its remarkable eosinophilic leucocytosis, counts ranging between 1,000 and 50,000 eosinophils per cmm The severity of the symptoms was unrelated to the degree of eosinophilia, and sudden unexplained drops in the eosinophil count lasting from one to four days were occasionally noticed

Sputum was examined for mites by the method described by CARTER *et al* [this *Bulletin*, 1946, v 43, 683] Out of 67 cases examined mites were present in 42 Four genera were recognized, *Tarsonemus*, *Tyroglyphus*, *Glyciphagus* and *Carpoglyphus* Various stages in the life-cycle were seen, male and female adults, hypopion forms, nymphs, larvae and ova Eighty per cent of the patients investigated lived in an environment which exposed them to the risk of inhaling airborne mites, and 56 of them worked in ration stores, cookhouses, bakeries, grocery shops, mills or warehouses Sputum from a series of 44 controls was also examined for mites by the same technique The control consisted of three groups, 13 persons suffering from respiratory disorders not associated with eosinophilia, 17 healthy persons employed in army stores, cookhouses, etc, and 14 healthy persons selected at random

Treatment consisted of four to eight injections of arsenic in 12 cases, neoarsphenamine, tryparsonum, or acetylarsan being used once or twice weekly in doses graduated from 0.1 gm to 0.5 gm The other patients were given oral carbasone, leucarsone or stovarsol, one tablet twice daily It was found that the decline in eosinophilia continued after cessation of treatment, and prolonged dosage was therefore unnecessary
H T H Wilson

MONTESTRUC, E Un traitement pratique de la pseudomyiase rampante [A Practical Treatment for Creeping Eruption] *Arch Inst Pasteur de la Martinique* 1949, Jan, v 2, No 1, 24-6 [12 refs]

The author, writing from Martinique, discusses the literature regarding the incidence and aetiology of creeping eruption and goes on to discuss its clinical manifestations It is suggested that *Ancylostoma brasiliense* is the possible local cause Many of the treatments tried for this refractory condition are mentioned Ethyl chloride sprays are probably the most effective measures

yet known. In the absence of this substance in Martinique a trial was made with ice. Ordinary small blocks of ice from the tray of a refrigerator were applied on and around the lesion, until all the ice had melted (about 10 minutes, usually). The itching ceased almost at once. A second application was made the same day and on the next day the track, erythema and itching had all disappeared and have not recurred. This method has been confirmed with like success in several subsequent cases. Two applications daily for two days are claimed to be usually sufficient to clear the lesions completely. Such a treatment is obviously both simple and cheap. *H. J. O'D. Burke-G. ff. et.*

MÁNGUZZI R. V. & VIVAS, M. M. Apendicitis por paratubos. [Appendicitis associated with Paratubos] *Prensa Méd. Argentina*. 1948 Nov 19 v 33 No. 47 2252-3

An account of two cases. In one 1 *Enterobius* and in the other segments of *Taenia saginata* were found.

ENTOMOLOGY AND INSECTICIDES GENERAL

DAKSHINAMURTY S. The Common House-Fly *Musca domestica* L., and its Behaviour to Temperature and Humidity. *Bull. Entom. Res.* 1949 Dec., v 39 Pt. 3 339-57 6 text figs. & 4 figs. on 1 pl. [38 refs.]

The housefly is concerned in the dissemination of a number of disease organisms but, although it is well established that its abundance and activity and the incidence of fly borne diseases are dependent on climatic conditions, little is known of how these conditions affect the adult fly. The present paper is part of an extensive study of the factors controlling fly density. It is concerned with the responses of adult flies to gradients of temperature and humidity and to combinations of these two important environmental factors.

The experiments, which were carried out in a choice chamber modified from the type used by GUKK and KEXSEBY (*J. Exper. Biol.* 1933, v 13, 450) and further developed by THOMSON [this Bulletin 1938 v 33, 913] were designed on a pattern permitting the results to be examined by an analysis of variance.

In addition to the experiments arranged to investigate choice observations were made with the same apparatus on the activity of flies at four combinations of temperature and humidity.

The author first finds that the flies selected the lower of the two humidities in each of the following choices provided at 23°C. —20-40 per cent. 40-60 per cent. 60-80 per cent and 80-100 per cent relative humidity (R.H.).

In arranging the apparatus for studying their responses to a choice of two temperatures the difficulty that a temperature gradient necessarily involves a humidity gradient is met in the following way: selection is made of a graded series of acid water mixtures which provide in one experiment, a constant R.H. value but a saturation deficiency (S.D.) gradient. In a parallel experiment the mixtures are selected so that a constant S.D. prevails throughout the chamber but the R.H. varies with the temperature gradient. Thus for example a constant R.H. of 65 per cent in the gradient 20-30°C. results in saturation deficiencies of 6 mm. and 11 mm. S.D. at the temperature extremes. Conversely in this same temperature range constant S.D. of 8 mm. provides an R.H. of 53 to 75 per cent. It will be observed that each temperature extreme is associated once with the drier air (e.g. 20°C. with 11 mm. S.D.) and, in the parallel experiment, once with the moister air (e.g. 30°C. with 75 per cent

R H) Similar conditions prevail for the other temperature choices investigated, namely, 30°C or 40°C and 27°C or 33°C

It is shown that flies, when given a choice of 20°C or 30°C and 30°C or 40°C chose 30°C regardless of whether this temperature is coupled with the drier air or the more moist air

The first demonstration—that at 25°C flies selected the drier air in the four humidity ranges offered—is then confirmed at 25°C and 35°C (mean values of the two temperature ranges) in experiments in which the humidity ranges were limited to those investigated at 20–30°C and 30–40°C. The choice was again for drier air

An experiment is then made suppressing the temperature factor. A limited range of 27° to 33°C is found to be suitable and humidity ranges are offered of 10.6 mm to 15 mm S D (R H = 60 per cent throughout the chamber) in one experiment and, in the parallel test, 50 to 60 per cent R H (S D = 13 mm throughout the chamber). The flies chose again the drier atmosphere, namely, 15 mm S D at 33°C and 50 per cent R H at 27°C. It is concluded that, provided there is not a temperature gradient great enough to induce a reaction to temperature, flies select the drier air. It appears from this type of result also that it is not possible to decide whether houseflies choose by the R H scale or the S D scale. This is the author's conclusion although (p. 350) he notes that there is a statistical indication that the choice of humidity is dependent on the S D scale.

These responses are next related to activity as observed in four separate experiments on flies at 35°C and 18°C, each temperature being tested once in association with 20 and once with 90 per cent R H. Flies were found to be most active at 35°C and 20 per cent R H, least active at 35°C and 90 per cent R H, intermediate, and similar, in activity at 18°C and each of the humidities. That is, at the low temperature, humidity had no effect on the flies' activity, but at a high temperature activity occurred particularly in the dry air and was slight in the sub-saturated air.

In an interpretation of these results it is suggested that flies, since they select dry air, must have an efficient spiracle closing mechanism and be able to absorb water from their faeces before its passage. It is known, the author points out, that metabolic rate is a function of temperature and that higher temperatures involve an increase in the metabolic rate with need for loss of excess metabolic water. In dry air this is assured because the increased respiration rate of the fly provides facility for evaporation of water in the tracheal tubes through the open spiracles; this physiological mechanism assists, it is supposed, in keeping the body below the environmental temperature. In a highly humid atmosphere at high temperatures this cooling effect cannot take place since the evaporative power of the air is inadequate. A fly might therefore die in these circumstances owing to the direct effect of temperature, and certainly can become inactive (e.g. at 35°C and 90 per cent R.H). In dry air at high temperature (e.g. 40°C) there is, however, risk of desiccation and the fly therefore prefers air at a lower temperature (e.g. 30°C) at which an adequate metabolic rate and activity can still be maintained and at which, even if more moist than the air at 40°C, loss of metabolic water is still possible. Cooling of the body can therefore still occur and the risk of desiccation is less. At low temperatures (18° or 20°C) the metabolic rate is reduced correspondingly and with the lower respiration rate there is only limited opportunity for loss of water through the spiracles. Consequently, flies at lower temperatures are only moderately active and, furthermore, humidity can play little part in affecting this activity. Flies, therefore, go towards the higher temperature of 30°C where the metabolic rate and activity are increased. They would prefer a drier air but will again tolerate a

more moist air than at the lower temperature provided this is consistent, as it is at least at 75 per cent. R.H. with the need to get rid of the excess metabolic water. In circumstances where this is not possible a dropical condition is presumed to develop.

These interpretations are related to general observation on fly activity and density in the field. Hot dry conditions such as occur usually from 10 to 4 p.m. daily are associated with maximal fly activity. The tendencies of flies to be outdoor insects on hot sunny days and to come indoors in rain are considered to be a choice of the warmer and drier atmosphere. In temperate climates flies are most abundant sometime during the summer and this is a temperature effect but in the tropics differences of humidity related to rainfall incidence are more important than temperature which is generally suitable for flies at all times of the year. Examples are cited of flies being numerous and active in hot, dry inland areas (e.g. Delhi) but fewer and less troublesome in warm humid coastal cities (e.g. Madras, Calcutta, Bombay) or in the humid climate of Malaya. In the first case activity and abundance are associated with high temperature and low humidity. In the humid regions although the temperatures are suited to activity the humidity is too high the fly activity is limited, its reproductive potential lowered and its numbers therefore are less.

These observations are made with due regard to the incidental but important effects of climatic conditions on other aspects of the flies' biometrics.

D. S. Britton

Twinn, C. R., Hocking, B., McDuffie, W. C. & Cross, H. F. A Preliminary Account of the Biting Flies at Churchill, Manitoba, Canada. *J. Res. Sect. D Zool. Sci.* 1948 Dec. v. 28, No. 6 334-57 14 figs. [16 refs.]

At the request of Canadian and of United States Government Department the authors carried out a survey of the biting flies in the neighbourhood of Churchill, Manitoba, with a view to devising control measures. The survey covers the period May 16th to August 10th, 1947.

Churchill in the subarctic region, lies at the mouth of the Churchill River on the west shore of Hudson Bay. The terrain is varied and the following types of country occur: spruce-larch forest, shrubby willow-birch associations, tundra and tundra meadow extending to the tidal flats and sand dunes of the Hudson Bay shore.

The snows melt about May and numerous ble pools and much marshy ground persist throughout the spring and summer. The river is free ice about mid June. The average monthly figures for climate in May, June, July and August were respectively: temperature 74.5°F, 44.8°F, 48.3°F and 54.3°F; relative humidity 91.5 per cent. in May and 84 per cent. from June 1 to August; windspeed—11 to 14 m.p.h.; rainfall—0.15, 0.91, 0.94 and 4 inches; cloudy condition prevailed for about half the time.

Mosquitoes—No anophelines are recorded. *Aedes triseriatus*, 4 species, 1 nearcticus, 1 communis, 1 confusus, 1 excrucians, 1 flavescens and 1 cinctus occurred in that order in abundance breeding in the various pool and marshy ground. All overwinter in the egg stage. Adult emergence at a peak about the end of June; biting activity is maximal about mid July but by early August mosquitoes are practically less in number. Biting occurred chiefly from sunset to sunrise but forest species would bite in the day time. Females of several species have been found carrying the pollen of orchids (*Isotria medeolae*) on their heads. It is suggested that the mosquitoes in feeding on the nectar of orchid effect pollination. *Culiseta inornata* and *C. impatiens* were few in number. Details are given under species concerning places and habits of all ten species.

Simuliids—The following species are recorded —*Simulium venustum*, *S vittatum*, *S ottawaense*, *S arcticum*, *S perissum* and *Lusimulium baffinense palens*, *E latipes* and *E aureum* together with four possibly new to science. *S venustum* is the most important blackfly pest of man, breeding in ditches, drains and rivers. It is thought to overwinter in the egg stage at Churchill. Adults are very numerous by mid-July. Eggs, larvae and pupae occur into August, there being probably three generations each summer. Detailed notes are also given for *S vittatum*, *E latipes*, *E aureum* and the new (unnamed and undescribed) species.

Tabanids—Collections were made incidentally to other work. No males or immature stages were taken. The following species were found —*Hybomitra affinis*, *H septentrionalis*, *H metabola*, *H zonalis*, *H hearlei* and *H gracilipalpis*, *Chrysops carbonaria*, *C furcata*, *C nigripes* and *C frigida*. The first two species of each genus were the most abundant, occurring from early or mid-July into August, and with *Chrysops* appearing to bite man more readily. *Chrysops* was seldom taken outside woodland. *H affinis* was attracted in large numbers to vehicles, including trains and track vehicles, settling on a standing vehicle rather than on a nearby person. It seemed that the warmth of the vehicle, which had just halted in the instances observed, was the attractant, movement stimulated pursuit. Tabanids were biting in daylight, preferably in the sun, and only above 55°F. Although often in buildings they did not bite indoors.

Suitable clothing and "a good standard repellent such as DMP" provided good protection against tabanids. Accounts of control and protective methods against these biting fly pests are to be published elsewhere. D S Bertram.

BOHART, R M. A Synopsis of the Philippine Mosquitoes. Named No 580, [1+388 pp., 10 pls [33 refs] multigraph [Washington, D C] Dep. Navy, Bur Med Surg [1945] [Summary taken from *Rev Applied Entom* Ser B 1949, Jan, v 37, Pt 1, 10]

This paper contains keys to the mosquitoes found in the Philippine Islands, together with notes on the morphology and distribution of most of them, the synonymy of some and the breeding place where known. Tables are included showing the Philippine species of *Anopheles* that have been incriminated as natural or experimental vectors of malaria.

MARKS Elizabeth N. Studies of Queensland Mosquitoes. Part III. The *Aedes* (*Finlaya*) *australiensis* Group. Univ of Queensland Papers. Dept of Biology 1948, Aug 16, v 2 No 8, 42 pp., 17 figs.

BOHART, R M. A Key to the Chinese Culexine Mosquitoes. Named No 961, 23 pp., [19 refs], multigraph. Washington, D C, Navy Dep, Bur Med Surg, 1946. [Summary taken from *Rev Applied Entom* Ser B 1949, Feb, v 37, Pt 2, 27-8]

Keys are given to the adults and larvae where known of the mosquitoes that occur in China, excluding *Anopheles*. Very brief notes are included on their distribution within and outside China, together with indications of the species that are natural or experimental vectors of disease in China or elsewhere.

BROUHAERT J. *Aedes aegypti* (Linnaeus) the Yellow Fever Mosquito in Arizona (Diptera). *Bull. Brooklyn Entom. Soc.* 1917 v. 41 No. 3 157. [Summary taken from *Rev. Applied Entom.* Ser. B. 1919 Feb. v. 37 Pl. 22.]

In a recent monograph *Aedes aegypti* L. was not recorded from Colorado Utah Arizona or California. However J. R. de la Torre-Dueno recently sent the author a male caught in his house at Tucson Arizona in October 1946 and stated that the species is well known in that locality where it is fairly common in summer and often annoying indoors through its attack on the ankles. It often bites during the day. If temperature conditions are favourable breeding continues during the winter.

CAMILLI R. & ABONNENC, E. Sur la myiase à *Dermatobia cyanicincta* en Guyane Française. Rôle vecteur de *Aedes taeniorhynchus* (Wiedemann, 1821) [Myiasis due to *Dermatobia* as a means in the French Guiana. Vector Role of *Aedes taeniorhynchus*.] Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication N° 175 1948, July 3 pp. 1 pl.

HARRIS R. & LAWIS D. J. Taxonomy of the Ethiopian Sandflies (Phlebotomus) III. New Species and Records. Alterations and Additions to the Keys. 4 n. *Trop. Med. & Parasit.* 1948, Dec. v. 4, No. 3 322-33, 17 figs. [11 refs.]

ABONNENC E. Phlebotomes de la Guyane Française (XXV). Ser. P. de ans Barretti et Coutinho 1940 et P. parvus Costa Lima 1911. [The Phlebotomus of French Guiana (XXV). P. parvus Barretti and Coutinho, 1940 and P. parvus Costa Lima 1911.] Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication N° 177 1948 Aug. 4 pp. 2 figs.

FLOCH, H. & ABONNENC, E. Phlebotomes du Venezuela (II). Description de P. atroclavatus Knab 1913 de l'espèce P. var. 1914 de P. atroclavatus Floch et Abonnenc, 1941 de P. basileus Floch et Abonnenc 1941 de P. punctipennis Floch et Abonnenc 1941 de l'espèce P. var. 1914 de P. ruficornis n. sp. [The Phlebotomus of Venezuela (II). Descriptions of P. atroclavatus Knab 1913 de l'espèce P. var. 1914 de P. atroclavatus Floch et Abonnenc 1941 de P. basileus Floch et Abonnenc 1941 de P. punctipennis Floch et Abonnenc 1941 de l'espèce P. var. 1914 de P. ruficornis n. sp. and P. ruficornis n. sp.] Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication N° 178 1948 Aug. 4 pp. 1 fig. [11 refs.]

FAIRCHILD C. B. & HEATH M. An Improved Method for Mounting Small Insects. *Science* 1948 July 2, 70-71

The following method of mounting specimen of P. var. 1914 was used: the authors and found to be more satisfactory than many others that have been tried.

The head, thorax and abdomen are separated and briefly boiled in 10 per cent. KOH. Alternately the insect may be gently warmed or be left for some hours in cold KOH. (The wings are not treated with KOH but are put straight into the stain.) The specimen is next rinsed in water and then stained with acid fuchsin in phenol for twenty minutes. After at least 1 hour it is rinsed in phenol and mounted on a cover slip in separate drops of phenol copal, or Canada balsam dissolved in pure phenol and left overnight.

In the morning the cover slip is turned over and a large drop of phenol copal on a slide. The cover slip should be supported at the corners by chips of cover slip glass to avoid crushing of the specimen. The preparation should now be dried in gentle heat.

In making preparations of the abdomen of female Phlebotomus the change from pure phenol to the mounting medium should be made in gradual stages.

It is pointed out that the spermathecae are best seen either in phenol or in water after the KOH treatment, and drawings should be made at this stage, as even with most careful mounting it is not always possible to avoid distortion

H S Leeson

BRISOU La prophylaxie moderne des maladies transmises par les insectes [Modern Prevention of Insect-borne Diseases] *Rev Méd Nav (Métropole et Outre-Mer)* Paris 1948, v 3, No 4, 347-63

A general review and discussion

BISHOPP, F C The Medical and Public Health Importance of the Insecticide DDT. Hermann M Biggs Memorial Lecture *Bull New York Acad Med* 1945, Nov v 21, No 11, 561-80 [22 refs]

FAY, R W, BUCKNER, A J & SIMMONS, S W Laboratory Evaluation of DDT Residual Effectiveness against House Flies, *Musca domestica* *Amer J Trop Med* 1948, Nov, v 28, No 6, 877-87, 6 figs

The residual effectiveness of DDT was tested by exposing three-day-old adult houseflies to treated panels forming the walls of a chamber

Normal ageing of panels with DDT deposits did not reduce the toxicity, but panels exposed to insects at frequent intervals showed a marked decrease in toxicity over periods up to 52 days The theory that this decrease in toxicity might be due to a mechanical removal of DDT by flies was tested by making a quantitative chemical analysis at the beginning and at the end of the experiment Although the mortality of flies was reduced from 75 per cent to 0 per cent over four months, the quantity of DDT was reduced only from 200 mgm/sq ft to 158 mgm/sq ft

Male houseflies were shown to be less resistant to DDT residues than female flies and since the ratio of the sexes varies considerably in different localities this difference is important in a field evaluation of DDT residual effectiveness

DDT was found to penetrate a roughwood surface more readily than plywood or wallpaper Owing to the loss of toxic residues accompanying absorption of DDT into a surface, a 2½ per cent DDT emulsion is normally used instead of a smaller volume of 5 per cent DDT Experiments in which 2½, 5 and 10 per cent DDT is used to give deposits of 200 mgm/sq ft in each case, on the three types of surface showed that 2½ per cent DDT was more effective than other concentrations on wallpaper and roughwood, but that there was no significant difference on plywood The residual effectiveness was much better on roughwood than on the other two surfaces

Panels treated with a DDT emulsion and others with a DDT water-wettable suspension were exposed to sun, or rain, or to sun and rain The emulsion residues were not affected, but the water-wettable suspensions deteriorated after five weeks' exposure to sun and rain, and after twelve weeks' exposure to rain alone

C M Harrison

LINDQUIST, A W, KNIPLING E F, JONES, H A & LAAKE, E W Blow Fly Control with DDT Sprays dispersed from Aircraft *J Econom Entom* 1948, Dec, v 41, No 6 971-3

ROMANA C & ABALOS, J W "Control" larvario de simuliidos y culicidos con Gammexane y DDT [Larval Control of Simuliids and Mosquitoes with Gammexane and DDT] *An Inst Med Regional Tucuman, Argentina* 1948, Dec, v 2, No 2, 107-46, 9 figs English summary

The authors describe the survey and treatment of twenty-one streams, which was carried out by one man, in a zone having an area of 75 sq km in

Argentina. The insecticides used were crystallized DDT dissolved in kerosene at the rate of 50 gm. insecticide per litre of solvent and Gammexane (benzene hexachloride—BHC) in wettable mixtures.

The minimum dose of Gammexane necessary for the elimination of *S. malin* is given as 700–1,000 mgm. per litre of water. A detailed account and tables are given of the observations and treatments of streams over one year.

Previously treatment against *Anopheles Culex* and *Simulium* in this area involved the clearing of vegetation along the streams and treatment with petroleum. This was efficient against *Anopheles* but not against *Simulium*. Moreover treatment with BHC requires less labour and thereby is 85 per cent. cheaper than the other method. Although treatment with DDT and BHC is simple and efficient it is practicable only when streams are of small or medium size.

It was observed that BHC also killed crustaceans and snails which are intermediate hosts in the life cycle of certain helminths. C. M. Harrison

MAIER J. REYDORFF R. C. & SCHLITZ, M. The Duration of Residual Effect of DDT Sprays on Building Materials used in Rural Venezuela. *Amer. J. Trop. Med.* 1948 Vol. V 28 No. 6 889–94

Three types of spray were tested —

- (1) 5 per cent. suspension in water of DDT 50 per cent. wettable powder
- (2) Emulsion in water of xylocel-Triton X 100 DDT concentrate
- (3) 2.5 per cent. solution of technical grade DDT in refined kerosene

Blocks of five common types of building material were sprayed at 1 gm. sq. metre (approx. 100 mgm./sq. ft.) blocks of *adobe* (sun-dried mud) *l. baroque* (sun-dried mud mixed with straw) *cucalado* (adobe with a coating of lime and water) *gambule* (thatching of coarse flat leaved grass) and *paja de cerro* (thatching of fine round leaved grass).

Wild engorged female mosquitoes were exposed to these blocks at monthly intervals, for periods of fifteen minutes and four hours.

After fifteen-minute exposures the aqueous suspension of DDT gave 100 per cent. mortality on all wall material in the first month and continued to do so on *cucalado* up to the fourth month, but on *adobe* and *l. baroque* gave only 40 per cent. and 45 per cent. mortalities respectively after three months. The emulsion and the solution were found to be less effective than the suspension although on *adobe* their effectiveness increased over the first three months. In the test on roofing material the suspension and emulsion gave approximately similar results but the DDT solution gave much lower mortalities.

Differences between the three types of spray evident in the fifteen minute exposure tests were not borne out by mortality counts 1 mosquito after four-hour exposures. Mortalities 17%–100 per cent. were obtained on material sprayed nine months previously and *cucalado* gave a 100 per cent. mortality after ten months.

The authors point out that under natural conditions mosquitoes are not likely to remain in contact with a treated surface for a period of four hours and that the result of the fifteen minute exposures probably gives a more accurate picture of the practical effect of spraying houses. C. M. Harrison

SARLES M. P. DOTT W. E. & MONROE D. H. Acute Toxicity and Irritation Tests on Animals with the New Insecticides, Piperonyl Butoxide. *Amer. J. Trop. Med.* 1949 Jan. V 29 No. 1 151–64.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

VAN DEN BERGHE, L. Un nouvel Institut Belge pour la recherche scientifique en Afrique centrale [A New Belgian Institute for Scientific Research in Central Africa] *Acta Tropica* Basle 1949, v 6, No 1, 51-2

In July 1947, the *Institut pour le Recherche Scientifique en Afrique Centrale* (I R S A C) was established in Léopoldville. The object of the Institute is the fundamental study of tropical conditions from the human, zoological and botanical aspects. For this purpose, the Belgian Congo is particularly well suited, because of its varying altitudes and dense network of communications.

In 1949 and 1950, several research centres will be erected in the Congo and in Ruandi-Urundi, where Belgian and other scientists will have facilities for pursuing their researches. These will include centres for experimental biology, anthropology, climatology, botany and nutrition.

The Institute will have its own scientific staff and equipment and will serve to co ordinate and extend the work of the different scientific institutions in the Congo. It will also serve as an information bureau and organization service for visiting scientists. It is claimed that the library to be established at the main centre will probably be the largest in Central Africa.

The I R S A C will not produce a periodical of its own, but its annual scientific reports will contain extracts from notes or publications by its members. These annual reports will be widely distributed throughout the scientific institutions of the world.

The Institute is administered, under Government sponsorship, by an Administrative Council, consisting of representatives of different branches of science. It is noted that, in addition to leading Belgian scientists, the Council includes three eminent foreigners, namely Dr E. B. Worthington (Scientific Adviser to the East African High Commission, Nairobi), Professor M. A. Chevalier (of the National Natural History Museum of Paris), and Dr Harlow Shapley (Director of Harvard College Observatory).

The Director of the Institute, who is already in the Belgian Congo, is Professor Louis van den Berghe, of the Tropical Medicine Institute in Antwerp and Tulane University.

H. J. O'D. Burke-Gaffney

GREAVES, F. C. The Health Services Program in the Trust Territory of the Pacific Islands. *US Nav Med Bull* 1948, Nov-Dec, v 48, No 6, 925-40, 7 figs (1 map)

The Pacific islands to which the author refers are those of the former Japanese Mandated Islands of Micronesia, they include 2,133 islands, atolls and reefs, in the Marshall, Caroline and Marianas Groups. There are about 50,000 inhabitants, who live in about 120 isolated island communities. Before contact was established with foreigners there were about three times as many people, but a century and a half of contact has meant epidemics of typhoid fever, smallpox, measles and other diseases, which displayed the severity commonly recorded in unsalted populations. At present there is little accurate information as to the prevalent diseases, though there is reason to believe that tuberculosis is widespread and intestinal parasitism almost universal, leprosy and venereal diseases also exist, and there is a form of encephalitis due to an unidentified virus, which would repay study.

In these islands there are civil administration dispensaries, with 325 beds and 18 medical officers, but the Guam Memorial Hospital of 300 beds can also be used, though Guam is not administratively part of these island groups. The American authorities have equipped a survey ship, which carries two medical officers, a dental officer, a public health official and their staff and equipment.

(including a photofluorographic unit). This vessel travels from island to island, all the inhabitants are examined and an assessment of the sanitary conditions is made. Eventually a considerable body of exact information will be available on which the structure of a health service can be based.

The training of the local people for health duties is promoted, and there are three schools, for medicine, dentistry and nursing respectively, at which the courses last 4 years. The people are lively and intelligent, and are "quick to accept the elements of civilization that benefit them, interest them, or amuse them."

The American authorities (presumably the naval authorities) have interpreted the Trusteeship Agreement literally, and have proceeded upon a course of action based upon accepted American standards. That is they do not propose to leave the people undisturbed, and to take only such health action as would be necessary to protect the American administrators, but rather to train the people to the adoption of American standards. Progress is being made in cleanliness, of villages, safety of food and water supplies, sanitation, etc.

[It will be interesting to see the reports of the medical survey when these are published. Before the war there was little information about these islands.]

Charles H. Stock

HARDING R. D. A Note on some Vital Statistics of a Primitive Peasant Community in Sierra Leone. *Population Studies* 1948 Dec. 1, No 3 373-6.

This paper records the results of thorough and repeated examination of all persons in a community originally numbering 1,408, living in primitive conditions in Sierra Leone: the examinations which were made in the course of an investigation into the manifestations of untreated yaws were repeated every two months for a year. The accuracy of the figures obtained is high, for almost the whole work was done by the author and his wife who soon knew the individual persons by sight and who usually succeeded in tracing absentees. Report of death were cross-checked as far as possible and are regarded as fairly accurate.

Among the 1,408 persons there were 29.3 per cent of men (over 15 years), 38.2 of women (over 15), 18.6 of boys and 16.0 of girls: this distribution corresponds with that of other communities in rural Sierra Leone. There were dispensaries within 15 miles of all the people but they were used mainly for trivial complaints and there was therefore little chance that medical interference had greatly influenced the statistics obtained except that the death rate from sleeping sickness had been reduced. The annual birth rate was 32.9 per 1,000 (± 3.77), the miscarriage and still-birth rate 22.9 per 100 live births, the death rate 78.4 per 1,000 (± 3.53) (there were no major epidemics) and the infant mortality rate was 417 (± 49) per 1,000 live births.

Of the total deaths (56) almost half were in children aged 3 years or less (26) of these 26, 10 were attributed by the relations to acute fever, probably malaria in most cases. An acute diarrhoeal disease, probably bacillary dysentery, caused 9 deaths. These figures may be compared with others previously recorded by the author [in a paper reviewed in this *Bulletin* 1940, 37, 697].

Harding makes the point that reasonably accurate vital statistics are necessary before satisfactory health plans can be made and suggest that small investigations such as he has made should be undertaken as often possible together: they would create a reliable body of evidence. This is of course very sound: it seems likely that missionary communities which are relatively stable would be able to contribute most useful information if they set out to obtain it.

Charles H. Stock

WEST, J B **United States Health Missions in Liberia** *Pub Health Rep* Wash 1948, Oct 15, v 63, No 42, 1351-64

This review relates to a period of 3 years, from November 1944, during which the Missions were at work in Liberia. The first duties were to ensure the good health of the American forces. The author gives some account of the medical services of the country and of the common diseases.

There were two hospitals at Monrovia, with 60 beds in all, not well equipped. The Firestone Plantations Company maintained a modern hospital of 100 beds near Roberts Field. There were 6 physicians and 2 dentists in Liberia, for a population of 2 millions.

The chief diseases are malaria, helminth infections, venereal diseases, and trypanosomiasis. The author makes the remarkable statement that "98.6 per cent of the mosquitoes aspirated from inhabited areas [of Monrovia, Kahata and Roberts Field] were *A. gambiae*", the remaining 1.4 per cent including other anophelines, *Culex fatigans* and *Aedes aegypti*. He describes the control measures adopted, which consisted largely of DDT residual spray and DDT in oil as a larvicide. In the three years there has been a great decrease in the number of cases of malaria treated in hospital. Chloroquine was available. The measures taken to cope with intestinal and venereal diseases are also described.

[The report is a small addition to our knowledge of the health situation in Liberia, but it is only a sketch.]

Charles Wilcocks

POINDESTER, H A **Experimental Animal Colony in Tropical West Africa** *Pub Health Rep* Wash 1949, Jan 14, v 64, No 2, 57-62

An account is given of an attempt to found a small laboratory animal breeding unit in tropical West Africa. The area chosen for the project was Monrovia in Liberia, at sea level.

The animals with which the colony was commenced came from the National Institute of Health Laboratories, Bethesda, Maryland, and consisted of 9 white rabbits, 16 guinea-pigs, 12 white rats and 18 white mice, the exact proportions of the sexes are not given.

On arrival of the animals at Monrovia, they were accommodated in cages in a well-built and well-ventilated animal house. Apparently there were accommodated in the same animal colony, local fauna of all sorts, including dogs, cats, wild rats, shrews, chickens, canaries, reptiles, frogs, fishes and others and all were fed on local products.

The resulting "tragedy" of an outbreak of *Salmonella typhimurium* infection to say nothing of the lesser ills described, should surely have caused no surprise under these conditions.

The next tragedy was cannibalism among the mice, guinea-pigs and rabbits. Apart from these positive deterrents to multiplication, the rabbits and guinea-pigs refused to breed, although they appeared healthy. The possible causes of this sterility are discussed without much light being thrown on the subject.

As a last resort, a few rabbits and guinea-pigs were transferred to Ganta, which is at an elevation of 1200 feet. The food given here was similar to that given at Monrovia, with the addition of elephant grass.

In the case of both rabbits and guinea-pigs, the breeding results were highly successful in this new location. New rats imported from the United States bred well at Monrovia as did the white mice originally imported.

From the general account of these breeding operations, it is evident that at least some of the trials and tribulations encountered were due to inexperience and could have been avoided by the application of knowledge already possessed.

by others long experienced in the care of laboratory animals in the tropics. In the discussion (4 lines) it is stated that "cross breeding of the temperate zone experimental animals with native stocks seem to be indicated." (There is nothing in the account to show how this conclusion even if correct is arrived at unless the addition of two female and one male rabbit obtained in Liberia and sent to Ganta, supplies the evidence for this generalization.)

H. E. Short

COOBNOR. The Pasteur Institute of Southern India, Coonoor. Annual Report of the Director together with the Forty-First Annual Report of the Central Committee of the Pasteur Institute Association 1947-48. 48 pp. 1 chart. 1948. Madras. Diocesan Press.

This report follows on the same lines as that for 1946-47 (this *Bulletin* 1948 v. 45: 657).

During the year 18,551 patients received the Institute's anti-rabic vaccine either at the Institute or at Subsidiary Treatment Centres. At the former 323 patients received a complete course and 61 received incomplete courses of treatment. There was one death. At the subsidiary centres 13,930 patients were treated (8,799 complete courses). There were 11 deaths among these all occurred among Asiatic patients who had been exposed to dog bites. In Madras and neighbouring states 1,321 animals were also treated and these included 855 dogs. Detailed statistics relating to rabies are shown in 10 tables.

The research work in the Institute and the Nutrition Research Laboratories includes a number of studies already noted in this *Bulletin* and the *Bulletin* of *H. 1948*. These investigations included work on rabies virus and vaccines, growth requirements of *V. cholerae* in media and tropical eosinophilia in experimental animals. Work was also done on the vitamin B complex, vitamins A and D hydrogenated oils, erythrocyte phosphatase, metabolic disorders of the liver and experimental lathyrism.

A Nutrition Clinic was established in 1947 and 219 cases of nutritional disorder were examined during the year. They are classified in a table in the text.

In the Southern India Branch of the Malaria Institute of India *Plasmodium gall narium* and insect vectors were maintained. Attempts to preserve *P. gall narium* by drying infected blood in vacuo were unsuccessful so far as infection experiments were concerned, a thin dried blood could not be re-dissolved in saline or fresh serum. The parasites appeared, however, to retain their morphological structure.

Experiment are in progress toward infecting partially incubated duck embryos through the chorio-allantoic membrane with varying quantities of blood from fowl acutely infected with *P. gall narium*. Studies on the biochemistry of *P. falciparum* were completed.

H. J. O'D. Berk. (author)

STRANUS, J. H. Reflections on the Course of Preventive Medicine in Malaya. *Med. J. Malay*. 1948 June v., No. 4: 221-38.

The presidential address delivered at the Annual Meeting of the Malaya Branch of the British Medical Association deals with the history of the impact of western medicine on Malaya. In the early years curative medicine monopolized attention. A Port Quarantine Service was established in 1900 but serious attention to preventive medicine had to wait till 1911 when the Health Service of the then Federated Malay States was founded. Rubber cultivation, increasing prosperity and disease prevention yielded increased dividend. The address provides much interesting information about Malaya of people and

their diseases, and the efforts made by research workers and health departments to control disease prevalence during the last 28 years this does not lend itself to summary For the future, outstanding tasks include the application of recently acquired knowledge and techniques to the control of malaria, an all-out attack on tuberculosis, much more attention to nutrition and deficiency diseases, and an orientation of the work of the Health Services towards social medicine

Norman White

HARRISON, J L *A Key to the Squirrels of Malaya* Reprinted from *Malayan Nature J* 1948, Dec, v 3, No 4, 201-9, 4 figs on 1 pl

EDDEY, L G *An Example of Effective Disease Control in a Tropical Mining Community* Reprinted from *Brit Guiana Med Ann*, 1947 1948, 162-81, 6 figs

This short report is written by Eddey, but he makes it clear that the work described was initiated and carried out by Dr Michael Kenney, who "could not be persuaded to publish an account of these methods" Kenney was Resident Physician to the Kwakwani settlement of the Berbice Company, engaged in the mining of bauxite on the Berbice river in British Guiana This settlement differed from many others in its cleanliness and good appointments, and the credit for this state of affairs goes to Kenney who, from 1943 onwards, had made it his business to introduce improvements on a large scale He first instituted the routine of periodical examination of all the workers and their families (total about 400 persons), keeping adequate records and giving adequate treatment The examinations included bi-monthly blood examinations, and monthly stool examinations, but as conditions improved these intervals were modified In the early stages there was some difficulty over attendances, but this did not last long

At first the workers were not well housed, but Kenney made good housing, with efficient mosquito screening, one of his main objectives, and he introduced bed-nets In the early days of screening, some of the houses became traps in which large numbers of *Anopheles darlingi* or *A. aquasalis* could be found, with a very high rate of infection, but improvements were made so thoroughly, and the people were made to understand the matter so well, that soon the houses were largely mosquito proof [But it seems to the reviewer that this must have required much tireless supervision] DDT was used, and the more permanent antilarval methods were executed, the result was a great reduction in the number of anophelines captured

Hookworm infestation and filariasis constituted serious problems, but they were dealt with as vigorously as malaria, the former by treatment and sanitary measures the latter by anti-mosquito measures Food and water supplies were regulated Records show that from 1944 onwards the numbers of people given treatment in or out of hospital fell very considerably, as health conditions improved there was no slackening in the medical service given One interesting feature of the work was the formation of an elected Employees' Health Committee whose function was to take a direct share in the welfare of the settlement

[Altogether a notable achievement]

Charles Walcocks

BOOK REVIEWS

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE SECTION ON MEDICAL SCIENCES. Rickettsial Diseases of Man. A Symposium on the Rickettsial Diseases of Man, organized by the Section on Medical Sciences of the A.A.A.S., and presented at the Boston Meeting on December 26-29, 1948. Organized by M. H. SOUTER. Edited by F. R. MOUTON. 47 pp. 24 figs. & 3 maps. 1948. Washington 5. American Association for the Advancement of Science 1515 Massachusetts Avenue N.W. [16.25 37 B.]

This collection of 27 papers by 27 distinguished U.S.A. workers forms a very important contribution to knowledge of the rickettsial diseases of man. Special prominence is naturally given to the work of American investigators but the authors have by no means neglected the work of experts from other parts of the world, so that the book provides a concise comprehensive critical, and fully documented, review of the fresh knowledge of the subject that has been acquired during the years of World War II and up to the end of 1948. The papers were read in 1948 so that the date of publication, 1948, is likely to give rise to misunderstandings.

Apart from trench fever to which only a few casual references are made, all the known rickettsial diseases of man are dealt with from the points of view of epidemiology, aetiology, diagnosis, treatment and prevention.

Bull's fever is referred to as not having been proved to be a rickettsial disease.

Although most of the subject matter has been published elsewhere its presentation in the form of collected papers will be greatly appreciated by all workers on the rickettsial diseases, especially as many references are made to reports which have not been published.

The first paper by S. HARAR, Jr., as Director of the U.S.A. Typhus Commission, deals with Epidemic Typhus in the Mediterranean Area during the last War. Some sidelights are thrown on the dramatic story of the control of the 1943-44 epidemic in and round Naples but a final review of the subject is said to be impossible owing to the occurrence of serious differences of opinion with regard to the contributions made by the various persons and organizations concerned in the operations. It appears however that the workers chiefly responsible for initiating the method of personal delousing, employed in more than three million instances, with DDT were members of the Rockefeller Foundation Team including J. A. FRANKEL, F. J. SORRE and C. M. WATFORD, the last named of whom was actually serving with the Typhus Commission while on leave from the Foundation. Apparently the first trial of hand blowers was made in Mexico early in 1943 presumably by Rockefeller Foundation workers and it seems only right that the worker or workers who first devised the simple but revolutionary method of dusting fully clothed persons should receive recognition.

The paper on Louse-Borne Typhus in Europe during the war is by J. E. GORDON. The epidemics in Japan and Korea are described by A. B. SCOTT, Jun. K. F. MAXCY gives a vivid account of Scrub Typhus among the U.S.A. troops. Between August 1942 and December, 1943 there were 937 cases with 53 deaths in the American bases in the Pacific. Among the troops landed at Owl-Bank in Dutch New Guinea between June and August 1944 there were 1,409 cases with only seven deaths up to December of the same year.

In the India-Burma theatre between November 1943 and July 1945 there were 695 cases with 58 deaths among American troops.

The paper by J. H. DIXON on Outbreak of Q Fever during the War completes the description of the manner in which the rickettsial diseases affected the military forces of the U.S.A.

Clinical aspects of the fevers of the typhus group are dealt with in papers by A YEOMANS (louse-borne typhus), T E WOODWARD (murine typhus), R R PARKER (Rocky Mountain spotted fever), and F G BLAKE (scrub typhus).

The excellent article on Treatment of the Rickettsial Diseases, by J C SNYDER, was written before the discovery of the remarkable efficacy of chloromycetin.

D GREIFF, gives a critical summary of all the important work on the Biology of the rickettsiae. His view is that the organisms represent one of the earlier stages of the adaptation of pathogens to intracellular life, retaining their bacterium-like morphology and probably also some independent metabolic activity, while refusing to grow in cell-free media and failing to survive in dead cells.

H PINKERTON discusses the Classification of Rickettsiae and Rickettsial Diseases. He recognizes five main groups of the diseases in man —(1) Typhus (human and murine), (2) Spotted Fever (including boutonneuse fever, rickettsialpox? and any other strains?), (3) Tsutsugamushi disease, (4) Q Fever, and (5) Trench Fever? [The question marks are inserted by the author.] Trench fever is listed "only tentatively as a rickettsial disease." This sceptical attitude is not likely to be shared by many European workers.

The author refers to the reviewer's provisional classification of the typhus-like fevers according to the known transmitting vectors. This was originally proposed in 1921, not 1943 as stated by the author, it is described as "admirably simple and implying certain important epidemiological truths", and as being "the most difficult to disregard", but he finds it open to many serious objections "notably the suggestion that the three diseases are fundamentally more closely related than they actually are." Curiously enough this objection is completely refuted in a later paper in the present series by G B WOLBACH, the father of modern research into the typhus fevers, who writes "Rocky Mountain spotted fever, typhus and tsutsugamushi disease constitute a unique disease group when considered in the light of many common features—arthropod transmission, rickettsial etiology, clinical characteristics, and pathology." Wolbach also refers to the diseases as "the tick-borne, the louse-borne, and the mite-borne rickettsial diseases."

The author's other objections to the classification are (1) "the difficulty of substituting these terms for others which are in established usage" but the fevers are repeatedly called tick-borne, flea-borne, louse-borne, and mite-borne, and all of them have often been called typhus. (2) "That flea typhus, which is only a variety of louse typhus would be distinguished as sharply from the latter as the very different disease, 'tick typhus'." There is, however, a very real difference between flea-borne and louse-borne typhus, the former is primarily a disease of lower animals, a "zootic" disease, and so is closely related to tick typhus and sharply different in this very important respect from louse typhus which is a human, "demic", disease. (3) That "Q fever could not reasonably be called tick typhus", but why should it be so called?, it is not typhus-like and as Wolbach points out "it stands apart in its pathology". (4) That "the recently discovered rickettsialpox would make the term mite typhus ambiguous". Here again rickettsialpox is not typhus-like in its clinical features and so does not qualify for admission to the typhus group.

The author's use of the name spotted fever for the sub-group of tick-borne typhus fevers is open not only to the objection stated by himself, that the name has been given to meningococcus meningitis, but also because it is a literal translation of *Fleckfieber*, the German name of louse-borne typhus, and so is sure to cause the same confusion as has arisen in connexion with the German use of the name *Typhus* for typhoid fever.

In his discussion of the classification of the rickettsiae the author makes the following remark which will meet with general approval. "It therefore

2. The second study relates to the problem of malaria, its history, transmission in the Congo, the parasites and their development, and the general principles of treatment and prevention. The chapter is in effect an exposition of the facts of the disease and of its history, and a discussion of the present-day knowledge and of the problems still awaiting solution. It could be understood by a non-medical person.

3. In the third study Schwetz returns to trypanosomiasis in greater detail. He was a young doctor attached to the hospital service of the University of Lausanne when he first read of sleeping sickness in 1902. In 1909 he went to the Congo. In this chapter he deals with the subject on lines similar to those of the chapter on malaria—transmission, the parasites, control. In this chapter also the reader will gain the true impression of his immense first-hand knowledge of the subject as well as of his great erudition. It is, as before, an exposition and a discussion written with clarity and interest.

4. In the fourth study Schwetz explains the development of the medical service of the Congo and the means devised to deal with the complex problems presented in so large and varied a country.

Charles H. Roberts

AFRICA. Handbuch der praktischen Kolonialwissenschaften. (Handbook of Practical Colonial Information.) Vol. VI Part 2, pp. xii, 675-80 Figs. 1943. Berlin: Walter de Gruyter & Co. Krankheitsgeschichten und Gesundheitswesen [DISEASES P & OTHERS]. [Incidence of Diseases and Medical Facilities.] pp. 1-308. Die Akklimatisation der Europäer in Afrika [GROUPE 3] [ACCLIMATIZATION OF EUROPEANS IN AFRICA.] pp. 309-338.

This volume published during the war is but one of a series produced under the patronage of General Ritter von Epp and under the editorship of Dr. Erich Obst, Professor in the University of Breslau. The purpose of this book, as set forth in the introduction, is to describe the geographical pathology of Africa. Many of the statistics it is admitted are compiled on rather insecure grounds as comparatively few comprehensive microscopical surveys of this great continent have actually been carried through. The book before us therefore represents a very ambitious project and has been undertaken with consideration of the vast array of literature concerned.

It would serve no useful purpose to follow the articles in detail. They are composed on rather familiar lines and comprise many statements which owing to the lapse of time have become out of date. Under malaria, for instance, statistical tables presenting the estimated number of malaria cases per annum and the number of fatalities for various countries in the Dark Continent, and further details are given in an account of the status of malaria and black-water fever in each particular country or colony. Trypanosomiasis, kinasomiasis, relapsing fever, yaws, ulcers, trypansomiasis, leishmaniasis and rat-bite fever are handled in the same manner and distributional maps are included. The difficulties already mentioned are multiplied in dealing with intestinal infections, particularly the dysentery group. Even under the most civilized and organized conditions the exact differentiation of amoebae from bacillary dysentery is difficult enough, so that figures advanced in the field in this branch of an statistical service are generally open to question. Although a tremendous effort has been made to put a little front on this matter one is left wondering whether the imposing tables of the incidence of dysentery during the years 1929-1931 and comprising 686,773 cases are worth the paper they are written upon. For instance in 1931 12,024 cases of dysentery were notified from Egypt, while in the neighbouring Algeria there were only 39 and so on. Further on one reads that during the year 1929 in 75 faecal examinations no dysentery bacilli were ever found in Dar-es-Salaam. On the other hand in Zanzibar bacillary

dysentery constituted the predominant form. In 49 cultures 11 were positive (6 Shiga and 5 Flexner). In Mauritius and Réunion no attempt has been made to distinguish between the two main forms of dysentery.

These remarks by way of criticism may be said to apply to the other subjects such as typhoid, paratyphoid, plague, undulant fevers, the typhus group, yellow fever, dengue, phlebotomus fevers, worm infections, leprosy, the pock diseases, venereal diseases, avitaminoses, diphtheria, and zymotic fevers.

Medical institutions and facilities in every section of Africa are described in detail by C. SONNENSCHNEIN and some are illustrated by photographs.

The contribution by J. GROBER on acclimatization of Europeans in Africa, which occupies some 124 pages, is free from statistical errors, being based upon generally accepted data, but it is entirely spoiled for the benefit of future generations by periodic explosions of Nazi ideological propaganda. "Herrenvolk" is a word with a nasty tang and it recurs with alarming frequency. A very fine distributional map of the African continent showing the range of the main tropical diseases is appended in the cover. *P. Manson-Bahr*

PESSÔA, Samuel Barnsley [Professor catedrático de Parasitologia da Faculdade de Medicina da Universidade São Paulo, etc.] *Parasitologia Médica* [Medical Parasitology] 2nd Edition. Revised and enlarged. 997 pp., 409 text figs & 41 coloured figs on 2 pls. 1949. São Paulo. Editora Renascença S.A., Rua General Osório, 384.

The appearance of a second edition of this manual after an interval of only three years since its first publication (1946) is a testimony of its success and indicates a continued demand among workers in Brazil for a textbook of parasitology in their own language. The present edition has been revised and enlarged. In addition to the subjects dealt with in the first edition [which has been fully reviewed in this *Bulletin*, 1947, v. 44, 939], four chapters on spirochaetes have been included in the section on protozoology. The chapter on malaria contains the latest data on the exoerythrocytic stages of the parasites and describes the advances in chemotherapy (paludrine, mepacrine, etc.) made during and after the last war. In the chapter on anopheline mosquitoes an account is given of the new insecticides and repellents. The number of illustrations has been increased, including a second coloured plate depicting the haemoflagellates. Here and there mis-spellings have been noted, e.g. Prowazek for Prowazek, Fanthan for Fantham, *Leishmania braziliensis* for *L. brasiliensis*. However, these do not detract from the high standard of this treatise, which should be an indispensable guide to medical workers in South America.

C. A. Hoare

BINKHORST, C. D. *Toxoplasmosis. A Clinical Serological and Histopathological Study with special reference to the Eye Manifestations. Presentation of Twenty Cases of Proved or Presumable Toxoplasmic Retinopathy and Retinoencephalopathy with Associated Ocular Manifestations*. pp. x+163, 14 figs (3 coloured) & 6 folding coloured pls. 1948. Leiden. H. E. Stenfort Kroese's Uitgevers-Maatschappij N.V. [19s.]

Though first reported from man in 1923, toxoplasmosis has been recognized as a human protozoal disease since the appearance of the work by WOLF and his co-workers in 1939. During the last decade numerous contributions to this subject have appeared, indicating that human toxoplasmosis is probably cosmopolitan in its distribution and that the incidence of the disease is considerably higher than the several dozen clinical cases hitherto recorded. The use of serological methods of diagnosis has brought to light the widespread

occurrence of symptomless infection amounting according to Saldin to about 10 per cent. of the population.

However our knowledge of this disease is still fragmentary especially regarding its mode of transmission and epidemiology.

This book is divided into two almost equal parts. In the first part the author gives a detailed review of our present knowledge of toxoplasmosis. A description is given of the causative organism as it appears in man and other animal together with a host list. The available facts regarding the mode of transmission of toxoplasma are discussed, and a chapter is devoted to the various methods of diagnosis of toxoplasmosis—parasitological, serological and clinical. This is followed by a very complete account of all reported cases of toxoplasmosis in man including those in which the diagnosis was confirmed parasitologically, those in which it was based on the neutralization test and those diagnosed clinically. A separate chapter is devoted to ocular lesions, ocular symptoms associated with positive serum test and cases suggestive of this disease. A short account of the effect of drugs in toxoplasmosis concludes the first part.

In the second part the author describes in great detail illustrated by numerous figures and coloured plates twenty cases of toxoplasmosis observed by him in person varying in age from 10 days to 53 years all of which were characterized by pathological changes in the retina and brain with a localized ocular manifestation. In two cases the diagnosis was established by finding toxoplasms in the cerebro-spinal fluid while in the remaining cases there were ocular abnormalities resembling those in toxoplasmosis. In eleven of these toxoplasma neutralizing antibodies were demonstrated in the serum, while in twelve cases they were present in the mothers of the patient. In seven patients there were ocular signs and cerebral symptoms suggestive of toxoplasmosis. The author regards the retinal lesion as the most significant symptom in toxoplasmosis of the eye. These may be manifested by necrotic retinopathy, retinal granuloma and focal fundus changes. Among other ocular manifestations were noted optic atrophy, iritis, complicated cataract and microphthalmia. In view of the importance of clues presented by the retina an ophthalmoscopic examination is considered to be indispensable for a clinical diagnosis of toxoplasmosis. The author also draws attention to the frequency of toxoplasmic symptoms in the families of patient which seem to point to familial infection.

Both the up-to-date summary of our knowledge of toxoplasmosis and the original description of ocular manifestation in this disease form valuable contributions to the literature on the subject.

C. A. HALL

TROPICAL DISEASES
BULLETIN

Vol 46]

1949

[No 7

SUMMARY OF RECENT ABSTRACTS*

VI PLAGUE

Epidemiology Rodent Plague

Plague occurred in Malta (and in N Africa, Egypt, Palestine, Italy, Sicily, Rhodes and Corsica) in 1945, and CAUCHI (p 784) reports that there were 80 cases with 22 deaths. Infected rats were detected until early 1947, but not since. In this outbreak in Malta, during the year, 22,902 rats were examined, most of which were *R norvegicus*. BARNETT (p 998) found plague in 20 of them, of which 15 were *R norvegicus*. This is evidently the important rat in relation to plague. Zinc phosphide, arsenious oxide, red squill and ANTU were used against the rats.

ERZIN and PAYZIN (p 426) report an outbreak of plague in Turkey. They treated their cases with sulphonamides and serum, with success.

GIRARD (p 595) points out that the term sylvatic plague is a misnomer in that the rodents inhabit not forest land but steppe country. He claims that all plague in N Africa, French W Africa, Madagascar, the Netherlands Indies and in India, whether in towns, villages or hamlets, is murine, and the only reservoir is the domestic rat. Elsewhere, other rodents are involved, and plague rodents may therefore be distinguished as wild or domestic.

HOPKINS (p 995) thinks that plague has been present in Uganda from ancient times, latent but never absent. There is no sylvatic plague, and the rodent reservoir comprises *Rattus rattus* (previously *R (mastomys) coucha ugandae* which has now been supplanted by *R rattus*). *Xenopsylla brasiliensis* is the chief vector though *X cheopis* is present. For epidemics to occur there must, of course, be intimate contact between rats and man (and the rats are climbers, nesting in thatch or iron roofs) the average rainfall has always been about 45 inches in times of epidemics in Uganda. In the Léopoldville area of the Belgian Congo, WANSON *et al* (p 425) found *R rattus* and some of its varieties, but no *R norvegicus*, 22 species of non-domestic rodents have been recognized. Of the fleas, *X brasiliensis* was the most common on rats, but *X cheopis* was also very abundant. These are rarely seen in houses. Only 1 per cent of the field rodents carried fleas, *X nubicus*, *X brasiliensis* and *X cheopis*. The authors give much information on the rodents and their habits, and on the other ectoparasites found on them.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 v 45. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

The history of plague in the Americas is reviewed by FAUST (p. 476) and by HOEKINGA (p. 171) who comments on the chronic or latent infection form in rodents and on the long period of infectivity of fleas (exceptionally up to 396 days). For control in the face of epidemics the use of DDT together with the rat poison sodium fluoracetate ("1080") is desirable. Immunization with a killed vaccine of organisms grown at room temperature is practised.

In the United States the known area of infection of field animals with plague was extended in 1946 by the discovery of the disease in a prairie dog and in a pool of fleas from these animals (*Public Health Reports* p. 171). In the same journal (p. 513) it is recorded that plague was found in a pool of fleas from Dawson County, Texas. The fleas were collected from pack rats (*Neotoma micropus*). In *Public Health Reports* (p. 1082) an account is given of a fatal human case of plague in California, the first natural infection to be reported in U.S.A. since 1913. In 1947 rodent plague was recorded from 14 western States.

BARRETO & DE CASTRO (p. 171) sum up the epidemiology of plague in Brazil. When it was first introduced, in 1899 it was a disease of the chief ports. In the next period it passed to the cities of the interior, and in the third period, which continues to the present time, it is tending to disappear from the cities and to localize itself endemically in rural zones. It is associated with the storage of various crops in the houses of the people and these crops attract rodents. The principal vector is *X. cheopis* except in São Paulo (temperate zone) where *X. brasiliensis* is more important. Plague tends to increase in spring and autumn after the period of heaviest rainfall, with temperatures between 19° and 24°C., and relative humidity between 68 and 83 per cent. For diagnosis, haemoculture and intraperitoneal inoculation of guinea-pigs are advocated, but gland puncture is not approved. For post mortem diagnosis the bone marrow from unoperated digits is used. For treatment sulphadiazine is recommended. Penicillin has been discarded.

Transmission

LIMA and HATHAWAY (p. 173) have compiled a very extensive bibliography of fleas and their animal hosts and a catalogue of the flea of the world and of the animal hosts. This publication will be most useful as a work of reference. CHABALD (p. 944) has compiled a comprehensive list of rodent and flea concerned in sylvatic plague and in plague of domestic rodent and man. He recognizes the fact that all the Siphonaptera can become infected, and has never found any species of flea incapable of transmitting if they were numerous and acting on a preferred host.

BURROUGHS (p. 244) has calculated the vector efficiency of several species of fleas, and compared them with *Xenopsylla cheopis*. Efficiency is expressed numerically, the number being calculated according to a formula which takes into account various relevant factors. *X. cheopis* was the most efficient of the fleas studied followed by *Xenopsylla fasciatus* and others, but *Dermacentor mordax* showed only low efficiency which may have been a peculiarity of the particular strain used. Transmission by blocked flea is most important, but mechanical transmission also important in epizootics.

SHARIF (p. 947) has studied the nutritional requirements of flea larvae. Usually they live on decaying organic matter containing micro-organisms, and their principal requirements are protein and vitamin. The best diet is dried lake and yeast, blood and wheat flour though it quickened larval development, was not a satisfactory diet for the larvae. The vitamins are probably derived from the associated micro-organisms with the food. *X. cheopis* and *X. brasiliensis* grow better than *X. alba* on flour alone and this probably enables them to survive transport in grain even without rat.

In his studies on the bionomics of *X. brasiliensis*, EDNEY (p 332) records his findings on the factors which affect the longevity of adult fleas, for details the original should be consulted

In Saigon HÉRIVAUX and TOUMANOFF (p 596) observed an outbreak in man although the *X. cheopis* index for rats did not rise to the level of 5 per rat, usually regarded as the danger point This was the predominant flea, but there was no correlation between the index and the course of the epidemic TOUMANOFF and HÉRIVAUX (p 995) draw attention to the well-known fact that the microclimate in which fleas exist may be very different from the climate outside They found that the soil and refuse in which *X. cheopis* flourished were different from those where *X. astia* was found, the former soil was sandy clay, retentive of water, the latter was sandy It is known that the temperature requirements of *X. cheopis* are lower than of *X. astia*, and the differences in soil environments may be a reflection of the fact that evaporation of water leads to lowering of temperature

In a discussion of the part played by *Pulex irritans* in the transmission of plague, SWELLENGREBEL (p 74) makes the point that even if it is eventually proved that transmission by this human flea is important in any place, this should not lead one to under-rate the primary importance of measures directed against that part of the murine population which is living in close contact with man

HOPKINS (p 255) has published a key to the known fleas of East Africa

Aetiology

There is still argument about the identity of *P. pestis* and *P. pseudotuberculosis*, and some workers think that the latter is a variant of the former GIRARD (p 173) does not hold this view, but admits that bacilli from sylvatic plague differ from those of murine plague in that they acidify glycerin, and he thinks that under the influence of phage there might be further change in the direction of *P. pseudotuberculosis* He holds that extracts of plague bacilli are toxic for rats and mice, whereas extracts of *P. pseudotuberculosis* are not, and suggests that this test may be used to clarify the position ARAUJO COSTA (p 513) has written a monograph on the diagnosis of plague in rats He deals with the methods of differentiating *P. pestis* from other species of *Pasteurella*, especially *P. pseudotuberculosis*, and he strongly advocates the examination of bone marrow of decomposed animals

SANDOR *et al* (p 994) produce additional evidence to show that the antigens of *P. pestis* are not exotoxins or true toxins, but are bacterial antigens Plague antiserum is of the antibacterial, not of the antitoxic, type

Clinical Findings Treatment

MEYERS (p 174) discusses diagnostic difficulties in plague

WYNNE-GRIFFITH (p 704) reports an outbreak of pneumonic plague in Rangoon He does not think that this form of plague is particularly infectious in certain circumstances, the incubation period is short and there is a non-infectious phase for 24-48 hours after clinical onset Immediate isolation should abort an outbreak

MANI (p 74) sums up much work on chemotherapy with sulphathiazole and sulphadiazine, and discusses a broth vaccine used successfully during the war

In a large series of cases treated with sulphonamides WAGLE and COLAH (p 256) found that the best prognosis was in patients with leucocyte counts within normal limits The degree of septicaemia, calculated on colony counts of blood sown on agar, is the main factor in determining severity, and the fatality rate rises as the colony count rises

SIMON and CHASTRE (p. 377) have treated plague patients with sulphamerazine in various schedules and have found that a course of 3 injections (2.5 gm., 1 gm. and 1 gm.) at interval of 8 hours followed by oral administration of 1 gm. every 8 hours is about as effective as a course of sulphadiazine given every 4 hours. They therefore advocate this course of sulphamerazine because the 8-hour intervals are more satisfactory than the 4-hour intervals. For control of epidemics they rely on DDT. The use of cyanoga and kerosene-soap emulsion formerly advocated, is not now advised since it kills off the rats but has no effect on the fleas and is often followed by a sudden rise in incidence of the disease.

TIEN *et al.* (p. 517) report three recoveries in patients with primary pneumonic plague treated with sulphadiazine and they also report that virulent *P. pestis* were found in throat swabs from 4 of 4 symptomatic contacts so examined. The organisms persisted for 6-13 days and at least one of these persons was regarded as a true health carrier.

HEANG *et al.* (p. 598) report a case of pneumonic plague presumably contracted in a laboratory in which cure was effected by streptomycin and sulphadiazine with transfusions and administration of oxygen. Contact were given sulphadiazine and none developed the disease.

A preliminary report by KARACRAKDI and RAO (p. 333) on the use of streptomycin in a small number of cases of plague is very favorable. HADJIAN and VALERO (p. 784) report dramatic success with streptomycin in three cases of bubonic plague which were not responding to sulphonamides and penicillin. QUAY *et al.* (p. 597) find that streptomycin is the most effective therapeutic agent yet discovered for the treatment of all forms of plague in mice and guinea pigs and they suggest that it should be given early in human plague—2 gm. daily in bubonic, and 4-6 gm. daily in septicemic and pneumonic infections—together with antipest serum if there is profound toxæmia. MEYER *et al.* (p. 597) show that after intranasal instillation of virulent *P. pestis* in suspension in mice and guinea pigs there develops a primary pneumonia, like that seen in man. Immunization with avirulent or chemically killed *P. pestis* confers marked protection, and concentrated antipest serum protect and has some curative action. Sulphonamides are not very effective in pneumonic plague unless used with serum. Streptomycin is the most effective therapeutic agent known. For human pneumonic plague daily doses of 4-6 gm. streptomycin should be given early and continued for 8-10 days.

Immunization Control

MEYER and FOSTER (p. 596) show that agglutinin test, complement fixation test and white blood test have proved inadequate to assess the immunity provoked by inoculation of plague bacilli, and they have applied a mouse protection test with the serum of inoculated person to the subject. When the death rates and the survival times of the mice are taken into account, it appears that inoculation with a purified fraction antigen produces good antibody formation, that formalin killed bacilli and one strain of living avirulent organisms are much less effective, and that the famous Tjander strain is used in this experiment is not immunogenic. Adequate protection requires reinoculation with booster doses.

In control of outbreak in Haifa POLLOCK (p. 597) relied on residual DDT spray for building, DDT dusting powder for personal use and treatment with sulphadiazine and streptomycin. More permanent anti-pest measures are taken when possible but the immediate measures outlined offer the best means of quick control.

Within a week of the application of 5 per cent DDT powder to rat burrows and run in shore warehouses to in S. Carolina, the flea were absent

completely eliminated from rats NICHOLSON and GAINES (p 598) could not detect any significant degree of recovery on the part of the flea population three months later, and there was no better result from the use of 10 per cent DDT powder

Charles Wilcocks

MALARIA

BEDFORD, P D Persistent Malarial Infestation in Fully Mepacrinised Troops
[Correspondence] *Lancet* 1949, Apr 9, 627

This correspondent refers to the possible reservoirs of malaria among parasitized ex-Servicemen returning to temperate zones after service in the Tropics While serving in the R A F he decided, in attempting to compute the magnitude of the potential reservoir, that a minimal estimate could be formed from the number of healthy servicemen without a history of malaria who had been on regular suppressive mepacrine, but who harboured parasites in the peripheral blood Such men, on returning to Britain "would escape the blood examinations normally carried out on those with a history of overt malaria"

In late 1945, he selected 100 airmen all of whom fulfilled the following criteria —

(1) They had spent at least a year in the Far East under primitive conditions in hyperendemic malarious zones

(2) All had been taking 0.1 gm suppressive mepacrine for at least a year and had appeared to have absorbed it

(3) None had had a major illness nor a history nor evidence of malaria, proved or "clinical" in the past year

(4) All were fit at the time of sampling and had been in an area of low endemicity for over three months of the cool season they were "due for home" in a few months

Thick blood films stained by Field's method showed that five of the hundred men had *P. vivax* gametocytes in the blood

The author discusses the future epidemiological significance of this finding, bearing in mind that latent malaria may declare itself after an incubation period of many months and he suggests that, even though indigenous malaria arising from returned servicemen is negligible up to now, "the detection and cure of even 5 per cent of healthy 'carriers' may well be considered as a rational public-health procedure" should the position change at some future date

H J O'D Burke-Gaffney

ZANETTI, V & LAMBRECHT, F L Notes sur la malaria indigène au Nepoko
[Indigenous Malaria in Nepoko] *Ann Soc Belge de Méd Trop* 1948,
Sept 30, v 28, No 3, 355-70

The Nepoko Valley is in the Stanleyville Province, Belgian Congo, 2° 30' N, at an altitude of 800 metres Rainfall is abundant, 2,000 mm a year November to January, inclusive is a relatively dry season, as are two or three weeks in July—August Anopheline density is low, *A. gambiae* occurs The population is agricultural there are no large centres of population

The blood was examined of 1,562 persons, of both sexes and all ages, attending three rural dispensaries for any reason, between April and December Malaria parasites were found in 547, 35 per cent, all *P. falciparum* crescents were found only eight times These 1,562 included a certain number of patients seeking treatment for acute malaria

During the same period, the blood of 160 women admitted to the Maternity Hospital at Pawa wa examined. All harboured malaria parasites, for the most part very few in number.

Other observations confirm the fact that the parasite index in this region is low compared with other part of the Belgian Congo. Clinically malaria is a mild disease among adults but may be very severe among infants. It is a very important cause of infant mortality.

Paludrine has been used both for treatment and prophylaxis. For treatment children from 1 to 3 years were given 0.03 gm. a day older children 0.1 gm. a day and adult 0.3 gm. a day for 10 days. Against schizont the action of the drug was rapid and potent against gametocytes negligible. In 4 cases mature schizont of *P. malariae* appeared in the blood during the first week of treatment and after *P. falciparum* had disappeared. Paludrine was ineffective against the sexual forms of *P. falciparum* and against *P. malariae* than either quinine or atabrin mepracine though very effective against *P. falciparum* schizont. It rapidly reduced splenomegaly.

In examining the blood of 1,873 persons of all ages the authors found microfilariae of *A. ochrochelonema perkinsi* in 927 49.5 per cent. and of *Loa loa* in 230 12.3 per cent. 1 *perkinsi* was found in 3 and *Loa loa* in 2 of 112 infants whose blood was examined during the first five days of life.

Norma Waite

SWELLENGREBEL, N. H. & SWELLENGREBEL, J. M. H. Malariaheersetting in de openvogende bevolijde klassen over autochthone bevolijung in hoog endemische malariegebieden der N.O. kust van Nieuw-Guinea. [Malaria Infection in Successive Age-Groups among the Indigenous People in Hyperendemic Malarious Areas in the North-East Coast of New Guinea.] *Nederl. Tijdschr. v. Geneesk.* 1945, Oct. 30. 82 (n) No. 44 3193-3214 4 graphs. English summary.

The human response to hyperendemic malaria is compared as it occurs in Sumatra, S. Africa, Sumatra and New Guinea. The West Indonesian form is characterized by uniform high spleen rates in all age groups while the high parasite rates in young children diminish with advancing years. The African form is characterized by high spleen rates in young children and lower ones in adult and this is combined with parasite rates which in children are double and in adult treble the W. Indonesian rates. On the other hand, the natives of hyperendemic areas in New Guinea show a parasitic response which closely approaches the African type and a splenic response which is intermediate between it and the W. Indonesian type. There is a gradual but not a fundamental difference between the two types. This difference is best explained not so much by racial peculiarities as by the rising immunity resulting from increasing rate of infection this in turn tend to diminish splenic action.

P. Manton-D. Jr.

YAO, Y. T. Synopsis of the Epidemiology of Important Parasitic Diseases in China. Part I. Malaria, with Keys to the Chinese Anopheline Mosquitoes. *Chin. M. J.* Chengtu Edition 1945 Apr. 63A No. 3 103-20. (Numerous ref.)

The summarized information was put together for the benefit of Chinese and foreign medical members of armed forces in China. Of parasitic diseases malaria kala-azar schistosomiasis and hookworm infection are of the greatest importance to China. Part I of the paper deals only with malaria.

Malaria is widespread in China and *P. falciparum* infection occurs all over the country. *P. falciparum* infections are only found south of 35°N.

where they are most prevalent in hilly regions. Endemic malaria throughout the country is predominantly due to *P vivax*. A summary of the salient results of numerous malaria surveys in different parts of the country is presented in tabular form. Blackwater fever is relatively common in Yunnan and Hainan Island, elsewhere it is very rare.

Thirty-seven species and varieties of *Anopheles* have been identified in China, these are listed with notes on geographical distribution of each. Seven species have been incriminated as vectors: *A minimus*, *A jeyporiensis candidiensis*, *A maculatus*, *A hyrcanus sinensis*, *A pattoni*, *A maculipennis atroparvus*, and *A sacharovi*. In hilly regions of the south, *A minimus* and *A candidiensis* are the most important vectors. In hilly regions of the north, *A pattoni* is probably an important carrier. *A sinensis* is the chief vector throughout the plains of China. *A atroparvus* is of local importance in Heilungkiang in the north-east and *A sacharovi* in Sinkiang in the north-west.

Keys are annexed to facilitate the identification of both adults and larvae of all species hitherto reported from China.

Norman White

FAUST, E. C. & HEMPHILL, Faye M. Malaria Mortality and Morbidity in the United States for the Year 1946. *J. National Malaria Soc.* 1948, Dec., v 7, No 4, 285-92, 3 figs (folding maps).

This is a yearly statistical analysis of the incidence of malaria in the U.S.A., illustrated by detailed tables and maps showing the morbidity and mortality in each State, for information on which it must be consulted in the original.

Between 1931 and 1938 malaria incidence increased considerably, and towards the end of the war returning soldiers provided many exogenous cases as well as a parasite reservoir from which others became infected, and about this time DDT came into use. Diagnosis has also improved. The effect of each of these factors cannot be disentangled from the total picture which shows a decrease in reported deaths from a maximum of 4,678 in 1933 to 341 in 1946, and in reported cases from 136,433 in 1935 to 47,903 in 1946. The authors have some critical comment on the reliability of data. They conclude that malaria is steadily declining, and in formerly hyperendemic areas is changing from an acute to a mildly chronic, essentially quiescent form.

G. Macdonald

WEYER, F. Die "Rassen" von *Anopheles maculipennis* in Deutschland [The "Races" of *Anopheles maculipennis* in Germany] Reprinted from *Ztschr. f. Parasitenk.* 1948, v 14, 33-59, 17 figs [13 refs].

Only *A. maculipennis atroparvus*, *A. m. messeae* and *A. m. typicus* occur in Germany. This paper first recapitulates the well-known problem of the morphological differentiation of these races and, in addition to the textual descriptions of the various stages of the mosquito, gives figures of the male claspette, the larval head, palmate hairs, and thirteen photographs of the diagnostically important egg patterns. It then goes on to outline the geographical distribution and biological characteristics of the three races.

A. m. atroparvus is primarily a coastal species breeding in brackish water, its eastern limit being Frische Haff. It occurs, however, 30-60 kilometres inland along river courses, e.g., the Elbe, and has been found as far inland as near Bochum and Paderborn in Westphalia, Hümmling in Emsland, Bad Oldesloe and Bad Sülze in Mecklenburg, also near Eisleben, Magdeburg and

Görlitz and in East Germany and the Black Forest. In inland regions the water may be fresh or salt. It breeds in animal watering ponds, weedy stagnant ditches, swampy pools, drains and often in small open pools with limited vegetational growth. Precipitin tests have shown *strophurus* to feed on pig, horse, cattle, goat, sheep, rabbits and less frequently on man in nature but it will feed on man readily in captivity. The adults are found in spring and summer in stables, cattle-sheds, pigsties, rabbit hutches, sheep and goat sheds but not in fowl houses or kennels. During hibernation they rest mainly in lofts, barns and empty out-houses but some are to be found in occupied animal sheds. These are *strophurus* females which, since hibernation is only partial, have recently fed on the stalled animals. *A. maculipennis* females resting in occupied animal sheds in winter are always *strophurus*. Hibernation extends from September until the end of March. Winter blood meals require at 20°C. 2-3 days for digestion and 15-20 meals are required under experimental conditions for egg production.

A. m. messiae is the commonest race in Germany and is essentially an inland, fresh-water breeder. It is the only race occurring along the East Prussian coast, but the salinity of the breeding places there is not certainly known. It breeds in low lying marshy areas, in ditches, in standing water along the course of rivers or in the weedy edges of lakes. It occurs for example in the lake district of Mecklenburg and of Upper Bavaria, at Lake Constance and along the valleys of the Oder, Weser, Elbe, Rhine, Danube and Neckar rivers. The adults are found in summer in stables and cattle-sheds, less usually in pigsties and it is frequent in fowl houses and kennels. It hibernates completely and in the same type of resting places as *strophurus* except in stalls actually occupied by animals. *A. m. messiae* does not feed readily on man or rabbits in the laboratory but will do so on fowls. A high percentage contain blood in nature possibly of water fowl.

A. m. typicus is not found in the north sea-coast region of Germany. It is the least common of the three races and, although essentially a mountain race occurring in the Harz Mountain and the Black Forest, known from Mecklenburg, Westphalia and near Muehlburg and Görlitz. It is sometimes found in the same breeding places as *strophurus* and *messiae* in the Black Forest it is known from null ponds constantly refreshed by the cool water of mountain streams. Nothing is known of its host preferences but it is found in cattle-sheds in the Black Forest. Its hibernation habits are thought to be similar to those of *messiae*.

A. m. alpinus is monogamous, *messiae* and *typicus* are polygamous. A section records briefly the varying degrees of fertility between the races none of which when crossed are known to be capable of producing fertile progeny.

This paper contains nothing that is new concerning the biology or morphology of these races. It is a useful summary of the subject in view of the remarkable increase in the incidence of malaria in Germany since the end of the war. The Bulletin 1948: 45-109. The author states that the recent incidence of malaria in Germany is not due to a close relation between *Anopheles alpinus* and the human population as occurs in Holland but that transmission in such places as Berlin, Brandenburg in Württemberg and in the Rhineland is by *messiae*. In the reference quoted, the same author remarks that many new mosquito breeding places have appeared in Germany as a result of war-time destruction e.g. in neglected ruins, bomb craters, in neglected ornamental ponds and parks and as a result of beached dams and river banks or the blockage of water courses. In one year more than 1000 *Anopheles* breeding places were reported in Berlin. Another paper however gives concrete evidence incriminating *messiae* as the vector of the recent outbreak of malaria in Germany.

WHITE, R Senior **Malaria Transmission in the Light of Modern Evolutionary Theory applied to Malaria-carrying Mosquitoes** *Indian J Malariology* 1948, Mar-June, v 2, Nos 1/2, 13-33 [34 refs]

The author points out that even within the limits of Asiatic *Anopheles* there are several species which transmit malaria in a part of the area but not elsewhere. *A. sundaus* may cause an outbreak of malaria in a certain place, but at other times transmit the disease very rarely. Other small but constant differences exist within the limits of a species in the conventional sense. These and many other facts point to the existence of units of less than specific rank differing mainly in physiological characters [though it might be added, one must be cautious in considering the facts, some of which might be due to changes in the environment].

In considering these matters the author has been much stimulated by reading *Evolution—the Modern Synthesis* by Julian HUXLEY (1942). In this paper he makes extracts from that book, calling attention to the large number of similar cases which are recorded from other groups of insects. For instance, within a species there may be separate races which are adapted to different foods, there are what one might call psychological differences which reduce the cross-mating between groups within one species. The question of the distribution and spread of mutations through a population is also considered. Huxley has also called attention to that interesting phenomenon, the development of races of insects resistant to insecticides. The evidence seems to show that in certain scale insects and in codling moths a strain resistant to cyanide fumigation has been produced, which is also abnormally resistant to other toxic substances to which it has not been exposed. This phenomenon of a development of general rather than specific resistance is difficult to understand and, in Senior White's view, fundamental. He feels that before so very long we shall be forced to abandon the use of insecticides, even the most powerful, and that we shall achieve control to a great extent by the use of biological methods. The entomologist who has recently felt that his job may vanish because of the activities of the organic chemist will take courage.

The paper is full of interesting material and ideas. We have found it difficult to summarize. The author's conclusion is that there is a call "for investigators who will apply and extend the methods of pure zoological research to the problem of biological mosquito control."

P A Buxton

DE GAETANI, G F **Patogenesi della malaria. Stato attuale delle ricerche [Present Knowledge of the Pathogenesis of Malaria]** 58 pp, 1 coloured pl [Bibliography] Reprinted from *Atti Accad Sci di Ferrara* 1946

A general review

TAYLOR, H L, MICKELSEN, O & KEYS, A **The Effects of Induced Malaria, Acute Starvation and Semi-Starvation on the Electrophoretic Diagram of the Serum Proteins of Normal Young Men** *J Clin Investigation* 1949, Mar, v 28, No 2, 273-81, 1 fig [31 refs]

V HALLER, E **Die Erkrankungsdauer der Malaria (insbesondere der Malaria tertiana) [The Duration of Malaria, especially *P. vivax* Infections]** *Ztschr f Hyg u Infektionskr* 1948, v 128, Nos 3/4 379-87, 1 fig [25 refs]

These original observations were made from June to September 1945 in a prisoner of war camp at Rimini on the Adriatic and appeared to show that 1½ years from the last infection no further relapses occurred and that all risk

of sequelae had then ceased to exist. The material consisted of 1,202 soldiers originally infected in Sardinia (the majority had suffered from relapses (in the region of 60 per cent.) They had left Sardinia in September 1943. Without going into details the author feels justified in concluding that the duration of infection in tertian malaria seldom oversteps the two-year limit but usually no symptoms are manifested after 1½ years. That this is due to the disappearance of the parasite is suggested by the fact that it occurs before immunity is produced and while the patient is still susceptible to a fresh infection. In direct contrast are the findings in therapeutic malaria produced by blood inoculation. Here relapses seldom, if ever are noted after two months and only when the treatment has not been sufficiently vigorous. In the sterile period the blood is infective for mosquitoes while in the naturally contracted malaria this is not the case. In subtertian malaria relapses do not occur after a latent period of eight weeks and the infection seldom, if ever persists for one year in the human body (see also this Bulletin 1948 v 45 970).

P. Manson Baker

VAN DER ENDE H. Enkele gevallen van beenmergreterming door malaria. [Some Cases of Bone-Marrow Inhibition in Malaria.] Nederl Tijdsch v Geneesk 1949 Jan. 15 v 93 (1) No. 3 163-9. English summary (4 lines).

Ten cases of varying degrees of bone-marrow inhibition in each of which malaria (usually *P. falciparum*) was commonly the only ascertainable factor. The anaemia was severe accompanied by slight leucopenia and thrombocytopenia. megakaryocytes were also present. Malaria therapy was followed by great clinical and haematological improvement in each instance.

P. V. Manson Baker

ROBERTS J. I. Dysentery associated with Malaria. J Trop Med & Hyg 1949 Apr 52, No. 4 78-R.

Further details are given of cases of dysentery occurring in the course of a malaria epidemic in Nairobi, Kenya, which was originally described by Hirsch in this Bulletin 1941 v 38 230. The dysentery was of a milder type the stools not usually exceeding ten in 4 hours. Pus cells were rare in the stools the blood was often bright red, but occasionally dark as the result of petechial haemorrhages in the intestinal mucosa. Malaria was believed to be the cause of the dysentery because (1) the condition responded very rapidly to quinine treatment, (2) malaria parasites were found in the peripheral blood and in blood contained in the stool, (3) the cases were associated with high fever and headache and (4) dysentery organisms were rarely recovered from the faeces. The leucocyte count was generally within normal limits.

These cases are unlike those of true intestinal malaria a pernicious syndrome of *P. falciparum* malaria, which is much more severe and fatal, and shows developing and mature schizonts in the blood. In this series rings and gametocytes only are reported.

J. C. C. Currah

VAN SITJEN P. B. Enkele opmerkingen over de behandeling van malaria. [Observations on the Treatment of Malaria.] Nederl Tijdsch v Geneesk 1948 Dec 11 92 (15) No. 50 4044-42. English summary (5 lines).

In a person who has been repatriated from Indonesia malarial relapses are caused by the benign tertian parasite. In the question of appropriate treatment the whole problem of malaria therapy is discussed and it is concluded that the

best course of treatment to prevent relapses is a combination of quinine and pamaquin in a series of short courses of low dosage. The problem of nutrition is also important. *P Manson-Bahr*

DREISBACH, R H Antagonists for Fatal and Non-Fatal Doses of Quinine Intravenously in Depressed Circulatory States and in Hyperthermia *J Pharm & Exper Therap* 1949, Mar, v 95, No 3, 347-51

MOE G K, PERALTA, B & SEEVERS, M H Central Impairment of Sympathetic Reflexes by 8-Amino-quinolines. *J Pharm & Exper Therap* 1949, Mar, v 95, No 3, 407-14, 2 figs

"1 Pamaquine, pentaquine, and isopentaquine chronically administered to dogs produce impairment of sympathetic cardiovascular reflexes, but not of parasympathetic or respiratory reflexes

"2 Pentaquine and isopentaquine, but probably not pamaquine, cause similar effects in the monkey

"3 The impairment of reflexes is believed to be due to destruction of medullary cell-groups"

COLETTE, Mlle & POROT, M Les psychoses quinacriniques [Psychoses attributable to Quinacrine] *Algérie Med* 1948, Aug-Sept, No 7, 375-86 [15 refs]

The authors describe nine cases which came under their personal observation within a period of one year in which the patients developed acute mental derangement after the administration of quinacrine [mepacrine] in therapeutic doses. Five of the patients had a history of some form of mental trouble in the past, melancholia, short or prolonged confusional states, anorexia nervosa or the like. In six of the nine cases malaria could be definitely excluded as a possible contributory cause of the mental derangement. The onset of mental symptoms occurred very shortly after quinacrine treatment, within a week at most, except in one case where mental symptoms did not appear till one month after the ingestion of 3.5 gm of the drug.

All the patients had maniacal symptoms, accompanied in some cases by a confusional state, often by an anxiety state, at times intense, and sometimes by very painful hallucinations. The symptoms lasted for one to six months except in two cases in which mental symptoms were of only two and ten days' duration respectively. The ultimate prognosis is good in all cases. There is no specific treatment. Six cases were treated by electro-shock, the best method of calming maniacal agitation. In one case insulin coma was used with success.

The authors consider that quinacrine should be avoided in the treatment of patients with a history of past psychosis, or of patients in a state of mental disequilibrium. A warning is also given against a too hasty diagnosis of malaria, on insufficient grounds.

Norman White

GUIJA MORALES E Psicosis palúdicas y atabrinicas

This book is reviewed on p 684

SCHMITT, C L Present Status of Quinacrine (Atabrine) Dermatitis. Report of Six Cases. *Arch Dermat & Syph* 1949, Jan, v 59, No 1, 16-21

The author distinguishes two distinct types of quinacrine [mepacrine] dermatitis. (1) The lichenoid type which is generally recognized, and (2) an

eczematoid type which he considers to be ten times as common. This second variety is characterised by patches of closely set, dome-seated millary vesicles first appearing on the sides of the fingers and subsequently affecting the wrist and less frequently the feet, legs, ears, scalp, suprapubic region and scrotum. While the original eruption tends to heal a recurrent eczematoid dermatitis may occur months or years afterwards. The recurrent dermatitis is similar in appearance to the original one and may occur at previously affected sites or elsewhere.

H. T. H. Hudson

MONTHLY BULL. MINISTRY OF HEALTH & PUB. HEALTH LAB. SERVICE
(DIRECTED BY MED. RES. COUNCIL) 1949 May & 8 97-4 Recommendations on the Use of Paludrine (Proguanil) in Prophylaxis and Treatment of Malaria. Also in *Brit. Med. J.* 1949 Apr 2, 985-6 & *Lancet* 1949 Apr 2, 579-9.

"The following recommendations on the use of proguanil ('paludrine') in the prophylaxis and treatment of malaria and suggestions for trial are issued by the Colonial Office and the Medical Research Council on the advice of the Colonial Medical Research Committee. It should be clearly appreciated that the recommendations are tentative on the basis of present knowledge and that they are subject to review in the light of future experience and experiment.

Prophylactic Use

The dose recommended for suppression of malaria of all types in endemic areas is 100 mg. daily. For children the following dosage is advised: from birth to 5 years—25 mg. daily; from 6 to 1 year—50 mg. daily. When a daily dose is not practicable one dose of 300 mg. should be taken on the same day each week; dosage for children should be in the proportion indicated.

"In the case of persons other than the indigenous inhabitants who have been resident in an endemic area for some time or who have been otherwise already exposed to malarial infection, a full therapeutic course (see 1 () below) should be taken before entering on the suppressive regimen.

1. *P. falciparum* (Malignant Tertian) Infections. Mixed Infections. Undiagnosed Type Infections.

"() *Treatment of Non-immunes.*—Proguanil alone cannot be relied upon to effect radical cure in all cases and the clinical response with this drug unaided is also somewhat slow. It has been shown, however, that these disadvantages may be overcome by reinforcement with mepracrine on the first day of treatment. The following combined course is recommended for trial: 300 mg. proguanil twice daily for 10 days reinforced on the first day of treatment with three doses of 300 mg. mepracrine and followed by 100 mg. proguanil daily for six weeks. (Persons continuing to live in an endemic area should continue their suppressive regimen.)

(b) *Treatment of Clinical Attack. Semi-immune Subject such as Law Forces and Rural Populations in Endemic Areas.*—A single dose of 300 mg. proguanil will usually suffice to produce clinical cure. Relapses can be treated similarly as and when they arise. Serious cases should be given emergency treatment (see below).

(c) *Treatment of Malarial Emergencies.*—For treatment of conditions such as cerebral or algal malaria and when for any other reason the patient is unable to take drugs by mouth, immediate intramuscular or intravenous quinine therapy should be employed.

2. *P. vivax* (Benign Tertian) Infections.

"() *If the Object is Radical Cure.* The course advised for adults is 100 mg. proguanil plus 10 mg. pamaquine base or corresponding dose of con-

of the other 8-aminoquinoline derivatives) three times daily for 10 days. The dose for children should be proportionate. Pamaquin should not be given unless the patient can be kept in bed under medical supervision throughout the course, this is particularly important in the case of children. When the patient cannot be kept in bed the alternative course recommended is 100 mg proguanil three times daily for 10 days followed by a single dose of 300 mg proguanil on the same day each week for a year.

"(b) *Treatment of the Clinical Attack in Semi-immunes*—As for M T malaria

"Unless otherwise stated, the dosage mentioned is that for adults. In recommending the use of a single dose of 300 mg proguanil for the treatment of the febrile attack in semi-immunes and a weekly dose of 300 mg for suppressive purposes, the advantages of these procedures are emphasized as (a) bringing an effective antimalarial drug within the economic capacity of village and rural populations of endemic areas of malaria and (b) providing a method of prophylaxis easy of administration."

TERZIAN, L. A. & WEATHERSBY, A. B. *The Action of Antimalarial Drugs in Mosquitoes Infected with Plasmodium falciparum*. *Amer J Trop Med* 1949, Jan, v 29, No 1, 19-22

Since only those drugs which acted as prophylactics in the vertebrate host prevented oocyst development in the mosquito, TERZIAN (this *Bulletin*, 1948, v 45, 767) noted, from experimental evidence, that there was a correlation between drug action in the mosquito (*Aedes aegypti*) infected with *P. gallinaceum* and in chickens infected with sporozoites of this parasite. The investigation has now been extended to *Anopheles quadrimaculatus* infected with *P. falciparum*. The earlier experiments with *P. gallinaceum* indicated that if sporozoites were present in the mosquito, they were always infective to the chicken host, and this has been accepted as a valid criterion of infectivity here, since it was not always practicable to test the point on human patients. The drugs used were added in sugar solution to the mosquito diet after they had fed on neurosyphilitic patients undergoing malarial therapy. Quinine, quinacrine [mepacrine], santonin (SN 6911) and sodium sulphadiazine did not prevent oocyst development or affect the production of sporozoites. Paludrine, however, prevented complete oocyst development, although some partly developed forms were present when dissections were carried out on the fourth day after infection. Sporozoites were never present. Similar results have been recorded by FAIRLEY (this *Bulletin*, 1947, v 44, 282). The correlation noted above for *P. gallinaceum* thus appears to hold in the case of *P. falciparum*. This method of drug evaluation in the mosquito should be of value in screening prophylactic drugs in human malaria.

J. D. Fulton

SEATON, D. R. & LOURIE, E. M. *Acquired Resistance to Proguanil (Paludrine) in Plasmodium vivax*. *Lancet* 1949, Mar 5, 394-5

Experimental evidence of induced resistance to various drugs in malarial parasites of monkeys and birds has been provided in the last few years (this *Bulletin*, 1942, v 39, 438; 1943, v 40, 754; 1947, v 44, 969, 970; 1948, v 45, 48, 158). The present investigation reports the production of resistance to paludrine (proguanil) in a strain of *P. vivax*. The patients were undergoing malarial therapy and the strain, which had not previously been in contact with paludrine, was maintained by blood inoculation. Two series of infected patients were treated with small doses of the drug. In the first series, 17 in number,

subinoculations from each patient were performed before drug treatment while in the second series repeated small doses of paludrine were generally given before subinoculation from that patient. The minimum effective dose of drug which would terminate fever and parasitaemia within a fixed time was established as 1.25 mgm. daily on three consecutive days. Resistance to therapeutic doses became apparent only towards the end of the observation period of 20 months during which 28 passages were made. At the end of that time it was approximately 80-fold in so far as three daily doses of 100 mgm. on successive days did not appear to influence fever or parasitaemia, although a dose three times as large did so. At the 23rd passage the strain was transmitted by mosquito and retained its resistant character. From their experience the authors conclude that there is little chance of producing resistant strains of the parasite by the clinical treatment usually employed. J. D. Fallon

PENIDO, H. M. DE SOUZA, F. F. & BEZERRA, F. P. G. Jr. Estudos sobre a ação de nova droga antimalárica no Vale do Rio Doce. [Study of the Activity of New Antimalarial Drugs in the Doce Valley] *Rev. Sem. Especial de Saúde Pública* Rio de Janeiro, 1948, July 12, No. 1: 27-34. 1 map. English summary (7 lines).

This preliminary study was designed to compare the efficacy of four new antimalarial drugs, each given in a single dose in the treatment of acute attacks of malaria in patients living in eight localities in the valley of the Doce River. In many of these places cases of malaria were few in number: the houses had recently been sprayed with DDT.

The four drugs tested were carmoquin, chloroquine, oxychloroquine and paludrine. For patients 15 years of age and over the dose of the drug administered was 1.0 gm. The total number of patients treated were coming in: 109 chloroquine 11 oxychloroquine 12 paludrine 33. Parasites were found in 87 of the patients: *P. falciparum* 43 *P. vivax* 37 *P. malariae* 4 mixed infection 3.

There were no symptoms of intolerance with any of the four drugs. Carmoquin was very effective. Paludrine gave the poorest results. Of 17 patients treated with paludrine 5 continued to show parasites in the peripheral blood 7 hours after the administration of the drug. These five patients were all in the group 1-4: they had each received only 0.25 gm. paludrine. Newman H. Kil

CHAUDHURI, R. N., RAI CHAUDHURI, M. N. & CHAKRABARTY, N. K. Chloroquine (BN 7618) in Malaria. *Indian J. Malariology* 1948 Mar-June 2, No. 1: 2, 12, 5 charts & figs.

Fifty patients with active malarial infection were treated with chloroquine in the Carmichael Hospital, Calcutta. Eighteen had *P. falciparum* 7 *P. vivax* 1 *P. malariae* and 4 mixed *P. vivax* and *P. falciparum* infection. The drug was given in tablet form each tablet containing 0.25 gm. of the base. Some patients received two tablets at the first dose, another tablet after six hours and then one tablet on each of the two following days—five tablets in all. The remaining patients each received a single dose of 1 x tablet. The above are doses for adults. The temperature fell to normal in an average period of 28.8 hours with the first treatment and 4.9 hours with the second. Asexual parasites disappeared within 35 hours with the first treatment and 25.5 hours with the second. These results were more prompt than those obtained with either quinine or quinine sulphate or paludrine. Symptomatic reactions were noted in 4 patients.

insomnia (4 cases), gastro-intestinal irritation (1 case), pruritus (3 cases), and pain in the lower abdomen, genitals and thighs (1 case) Gametocytes were apparently unaffected by treatment
Norman White

EJERCITO, A & DUQUE, M Preliminary Report on Cam-AQI Dihydrochloride (Miaquin, Camoquin) in the Treatment of Human Malaria *J Philippine Med Ass* 1948, Nov, v 24, No 11, 633-42

This paper reports the results of the first trials of the treatment of malaria with CAM-AQI to be carried out in the Philippines. Each patient treated received a single curative dose, the main object of the inquiry being to determine the suitability of the drug for treatment of malaria in the field. Each adult patient received 8 tablets, 0.4 gm, of CAM-AQI. In all 128 patients were so treated, 84 with *P vivax* and 44 with *P falciparum* infections. *P vivax* parasites and fever were absent on the 3rd or 4th day in most cases, in afebrile cases the parasites had disappeared on the 2nd day. Fever in *P falciparum* infections persisted from 3 to 5 days, schizonts disappeared from the blood in from 2 to 4 days. The drug had no apparent effect on crescents. No symptom of drug intolerance was ever noted. Only 9 of the *P vivax* patients and 1 *P falciparum* patient suffered relapse after treatment, the periods of observation are not stated
Norman White

JANG, Chang-shaw Present Status of Studies on Chinese Antimalarial Drugs. *Chinese Med J* Chengtu Edition 1945, Apr, v 63A, No 3, 126-30

Shortage of quinine and of synthetic malaria remedies during the war stimulated interest in indigenous remedies in China

Sinine, an alkaloidal substance obtained from the root bark of an ash tree, *Fraxinus mallacophyla*, which grows in the south-west of Yunnan, was tried and found wanting. For centuries past the bark has been used as a febrifuge.

Fravin, a glucoside obtained from the bark of *Fraxinus chinensis*, was tried in the treatment of eight patients with *P vivax* malaria. The author found it to be devoid of antimalarial properties.

Ch'ang Shan has been credited with antimalarial properties for 4,000 years. The botanical identity of the original Ch'ang Shan appears to be a matter of some doubt. The name is now applied to a herb, *Dichroa febrifuga*. An extract containing water-soluble substances from the root was given to thirteen patients with *P vivax* malaria. The results were stated to be comparable to those obtained with quinine in similar cases. Two alkaloids have been isolated from Ch'ang Shan, further chemotherapeutic studies were being made [see also this *Bulletin*, 1948, v 45, 755]
Norman White

GAGE, J C Synthetic Antimalarials Part XXXVI Physicochemical Studies on Pyrimidine Derivatives *J Chem Soc* 1949, Feb, 469-74, 3 figs

ASHWORTH R de B CROWTHER A F CURD F H S, HENDRY J A RICHARDSON D N MISS & ROSE F L Synthetic Antimalarials. Part XXXVII Some N¹-p-Chlorophenyl-N³ N⁴ N⁵-trialkylidiguanides and other Related Miscellaneous Diguanide Types *J Chem Soc* 1949 Feb 475-82

DRAKE N L, HAYES R A GARMAN J A JOHNSON R B, KELLEY, G W, MELAMED S & PECK R M Synthetic Antimalarials Some Derivatives of 8-Aminoquinoline II *J Amer Chem Soc* 1949 Feb, v 71 No 2 455-8 [Refs in footnotes]

RAY, A. P. Prophylactic Use of Paludrine in a Tea Estate. *Indian J. Malariology* 1948 Mar-June v. 2 Nos. 1/2, 35-46 4 graphs. [17 refs.]

The observations recorded were made in a Tea Estate in a hyperendemic malarious region of North Bengal. The labour force numbered about 700 including 800 children. The vector is *A. sinensis*. Prophylactic medication began on April 16 and was continued till October 29 1947. A single weekly dose of paludrine, 3 tablets (0.3 gm.) was given to 338 persons. 1 tablet (0.1 gm.) of paludrine was given twice weekly to 889 persons. 1 tablet of chloroquine (0.25 gm. base) was given once a week to 287 persons.

There was a remarkable decline in the incidence of fever cases during the period of drug administration. The number of cases recorded from April to October in each of the years 1941 to 1947 was 1941 1974 1942 1064 1943 3022 1944 2834 1945 3818 1946 2794 1947 158. Among the 158 cases of fever recorded in 1947 there were only 17 cases of proved malaria among 1750 adults who had been placed on prophylactic treatment. Attendance registers showed that all but one of these 17 patients had taken the treatment irregularly. Only one case was considered to be a genuine breakthrough.

The total death rate for 1947 was 18.6 as compared with 32.77 per thousand for 1946. The birth rate in 1947 was 39.3 as compared with 13.8 per thousand in 1946 and the infant mortality rate 171.05 as compared with 200.4 per thousand live birth in 1946. There was a marked improvement in the health and efficiency of the labour force.

VERMA, P. K. D.

KLOPPER, G. STOR, D. & OTT, L. A. D. Een onderzoek naar de suppressieve werking van paludrin bij malaria tertiana. [The Suppressive Action of Paludrine in Benign Tertian Malaria.] *Nederl. Tijdschr. Geneesk.* 1948 Nov. 27 v. 92 (n) No. 48 3922-9 4 figs. English summary (6 lines).

The effect of weekly paludrine therapy on the prevention of benign tertian malaria were investigated in a large number of persons. In doses of 100 mgm. a week for adults and 50 mgm. in children paludrine appeared to take off the clinical attack. In persons with a tendency to relapse paludrine in these doses appeared to suppress such a relapse.

P. MANSION HARR

SMITH, H. F., DE, F. J. & CABRERA, D. J. Studies on the Efficiency of Chloroquine and Chlorguanide as Antimalarials: I. As Suppressants. Reprinted from *Acta Mal. Philippina* 1948 Oct. Dec. 5 v. 16 pp. [12 refs.]

This study of the relative suppressive value of two antimalarial drugs was carried out simultaneously in two places in the Philippines among lumbermen and their families in an isolated valley 1,200 feet above sea level in the island of Luzon, and in a settlement on a plateau about 900 feet above sea level in Negros Occidental. Both localities have well-defined wet and dry seasons and in both abundant streams are prolific breeding grounds for *Anopheles* *farinosus*, the vector. Parasite and spleen surveys were made prior to the experiment. In both places the population was divided into three groups comparable to each other with regard to previous infection, spleen size, age and sex. Group I received chloroquine, Group II chlorguanide (paludrine), Group III received sodium bicarbonate as a placebo. Adults were each given two 0.25 gm. tablets of chloroquine or two 0.1 gm. tablets of paludrine or two tablets of 0.3 gm. sodium bicarbonate once a week. The administration was continued for 40 weeks.

Among 125 persons receiving chloroquine, 2 developed overt malaria of 104 receiving paludrine, 17 developed overt malaria of 106 receiving sodium bicarbonate, 54 developed overt malaria. Chloroquine appeared to be responsible for nausea and vomiting in two patients, vertigo in one, and flatulence in one patient.

With the doses used chloroquine was a more efficient suppressive agent than was paludrine

Norman White

WALLACE, R. B. Insecticides and *A. maculatus*. *Med J Malaya* 1948, Sept., v 3, No 1, 5-33, 1 plan & 8 charts

On a rubber estate in Malaya of over 10,000 acres in typical *Anopheles maculatus* country, pre-war methods of control of hyperendemic malaria by anti-larval measures had proved unsuccessful and were replaced by a reliance on drug prophylaxis with atebrin [mepacrine], post-war atebrin was in turn replaced by paludrine. The mosquito nuisance, however, remains and demands alleviation. If residual insecticides could be proved to be effective it was hoped that the mosquito population would be reduced to the extent of preventing the annual epidemic of malaria and, indeed, that, in combination with the power of paludrine to prevent the fertilized female gametocyte developing to the sporozoite stage in the mosquito, a diminution in general incidence of malaria would occur.

Incessant biting of employees by bed-bugs and mosquitoes led to a trial of eight insecticides, four of which contained DDT, two Gammexane and two "Technical Chlordane".

Preliminary trials with 5 per cent DDT in kerosene and with Gammexane dust in 1947 during the sixteen-week *A. maculatus* season gave "the impression that *A. maculatus* adults were completely eliminated from the lines", yet there was "no apparent effect on the breeding places nor on the malaria rate."

In the 1948 season, tests were conducted on the eight insecticides and the following entomological methods were used to assess the effects —

- (a) Weekly morning (5 a.m. till dawn) catches in dwellings
- (b) In one room only night (8 p.m. till midnight) catches of mosquitoes (i) caught in the act of biting, and (ii) engorged and resting on the wall or dead on sheets on the floor
- (c) Catches in untreated cattle sheds at the same periods
- (d) Catches in untreated control rooms at the same periods
- (e) Observations on breeding places

The insecticides were applied at fortnightly intervals [precise dosage is not stated] during the *A. maculatus* season. Under laboratory conditions all the insecticides were lethal to mosquitoes; none prevented *A. maculatus* entering rooms and feeding; all reduced the early morning catches in varying degree, some to nil without any evidence of dead mosquitoes. An irritant effect is ascribed to the DDT group affecting both morning and evening catches. Larval density in breeding places and the malaria rate were not affected. The author concludes that "There is still no proof that it [DDT] is the most effective insecticide against *A. n. maculatus*" though presumably the best of this series.

These observations are comparable with those of Muirhead Thomson concerning the effect of DDT on *A. gambiae* in Africa thus *Bulletin* 1949, v 46, 439, the entomological methods used by the latter had a higher degree of accuracy. The Gammexane preparation used in Malaya was not the recent water-dispersible powder P 530 (now P 520) tested in East Africa with favourable results.]

R. Ford Tredre

DOWNS W. G. COLORADO IRIS R. & GARAN J. B. Residual Effectiveness of DDT in the Third Season after Application. *Amer J Trop Med* 1948 Sep. v 28 No 5 741-5

The mud brick houses in an area of Mexico where *A. gambiae* is prevalent were treated with DDT in 1945 the dose being 190 mgm. per sq. ft. (6.7 ounces per 1,000 sq. ft.). An identical collecting procedure was followed before and after treatment with the following results—

Date	No. of collections	Average mosquitoes per building	
		Treated buildings	Untreated buildings
1945			
Before treatment	3	12	9
After treatment	11	0.003	59
1946	4	0.75	18
1947	4	1.35	14.8

The presence of DDT two and a half years after application was shown by biological and chemical tests. G. Macdonald

MORRISON D. B. & JESKES H. A. Alterations in some Constituents of the Monkey Erythrocyte Infected with *Plasmodium knowlesi* as related to Pigment Formation. *J. National Malaria Soc.* 1948, Dec., v 7 No. 4 259-64 3 figs.

Assuming that the parasite pigment is derived quantitatively from the host erythrocyte haemoglobin and that the total erythrocyte haematin is constant the authors calculated total erythrocyte concentration in given samples of blood (monkey and duck) by measuring the total haematin and the average effective number of pigmented parasites (*P. knowlesi* and *P. l. m. l.*) by determining the parasite haematin. Alteration in parasitized cell of total % total lipids and total solids were also determined in relation to the amount of parasite haematin present.

In *P. knowlesi* malaria in *Macaca mulatta* they found that 0.76 per cent of haemoglobin was converted to parasite haematin when 1.0 per cent of erythrocytes were parasitized with the average pigmented form of parasite. This result compared favourably with that of BULL *et al.* (*Phil. Mag.* 1949 v 40, 117) who found in two monkeys infected with *P. k. m. l.* that 40 per cent total haematin existed as free haematin when there was 58 per cent infection of erythrocytes and 49 per cent as free haematin when there was a 67 per cent infection. These figures correspond to 0.72 and 0.79 per cent of haemoglobin being metabolized to parasite haematin in a 1.0 per cent infection.

The authors conclude that 78 per cent of host cell haemoglobin in *P. k. m. l.* infections in *M. mulatta* is converted into parasite pigment by an average pigmented form of parasite. Total % and total solids of the erythrocyte are reduced but there is an increase in total lipids. These changes presumably being brought about by parasite metabolism. B. G. Macdonald

HENDERSON F. G. ROSE C. L. HARRIS P. N. & CHEN H. K. Dichroins the Antimalarial Alkaloid of Chang Shan. *J. Pharm. & Exp. Ther.* 1949 Feb. v 93 No. 1 191-200 3 figs. 24 refs.

In the search for new antimalarials during the late war attention was drawn to Chang Shan, the root of an indigenous evergreen shrub of SW

China, much prized for its antimalarial properties there. The botanical name of the plant is now generally accepted as *Dichroa febrifuga* [For recent developments on the chemistry of the active principles present see this *Bulletin*, 1946, v 43, 1012, 1947, v 44, 699, 964, 1948, v 45, 578 and above, p 611] Substances have been obtained from the plant more active than quinine in *P. lophurae* infection of ducks and in *P. gallinaceum* infection of chickens. In China, one alkaloid isolated was named γ -dichroine (believed to be a quinazoline derivative), a crystalline substance of m.p. 160°C. In the present investigation this substance has been tested for antimalarial and other properties, in ducks infected with *P. lophurae* and canaries infected with *P. relictum*, determination of the median suppressive dose (SD50), that which reduces parasitaemia to half, in the case of γ -dichroine and quinine, showed that the former was very much more active. The new substance surprisingly proved more toxic to mice when given orally than by the intravenous route, and in lethal doses damage was done mainly to the liver. In pigeons the alkaloid had an emetic action as sometimes seen in man. Blood pressure and respiration in anaesthetized dogs was unaffected and intestinal peristalsis was stimulated. In unanaesthetized animals there was diarrhoea. In certain doses intravenous administration caused hyperglycaemia in rabbits. The drug also exerted an antipyretic effect.

J. D. Fulton

- 1 WINGSTRAND, K. G. On some Haematozoa of Swedish Birds with Remarks on the Schizogony of *Leucocytozoon sakharoffi*. *Kungl. Svenska Vetenskapsakad. Handl.* Stockholm 1947, v 24, No 5, 31 pp., 19 figs. [34 refs.]

- 11 — Further Studies on *Leucocytozoon sakharoffi*. *Ibid.* No 8, 17 pp., 12 figs. [11 refs.]

1. A description is given of six species of *Leucocytozoon* including a new unnamed one in a rook, and of two species of *Haemoproteus*, including a new one, *H. buteonis* in a buzzard. The endocrine glands of two young crows (*Corvus corone cornix*) showed the presence of the asexual forms of *Leucocytozoon*, viz. very striking megaloschizonts. They were found in the anterior and posterior portions of the pituitary gland, in a testicle, and in the thyroid. The youngest schizonts appear to develop in endothelial cells of capillaries. The young schizont is composed of a few "cytomeres," 2-3 μ in diameter, and each cytomere is surrounded by a vacuole. The nucleus of the host cell enlarges as does the cell itself. Eventually the diameter of the nucleus is enlarged 40 times, the cell itself measuring 470 μ . In these later stages, the cytomeres form a continuous layer around the nucleus, each is about 15 μ in diameter and contains numerous merozoites visible as deeply staining granules 1 μ in size. A zone of cytoplasm free from cytomeres surrounds the host cell nucleus. In adult birds this type of schizont was absent, a smaller kind in the hepatic parenchyma is described but whether the latter structures are truly parasitic even the author appears to doubt.

11. Material additional to that described above was examined in the organs of two half-grown crow nestlings which had suffered from very violent attacks of the disease (about 10 infected lymphocytes to 100 erythrocytes). The course of development of the megaloschizonts was observed in the spleen where they occurred in abundance. The host cell appears to be a macrophage. Development is described all in terms of the "cytomere." The cytomeres split up into "sub-cytomeres" bladder-like bodies with the granules concentrated on the surface. Eventually, all differentiation is lost and a continuous mass of merozoites is formed outside the host cell nucleus. The merozoites exhibit bipolar staining. The ripe schizont bursts and discharges a cloud of merozoites into

the adjacent blood vessel. The granules give a positive Feulgen reaction only in the final stages—earlier the usual Romanowsky or haematoxylin stains fail to show any chromatin. This substance, however, can be impregnated with silver by using the Bodian technique and then is visible throughout the cycle.

[These observations confirm Hirst's work (*J. Infect. Dis.* 1942, v 71 18) on another species of *Leucocytozoon*. The megalo-schizont of the Swedish parasite, however, appear to be five times the size of the American ones, reaching nearly half a millimetre in diameter. In size therefore they form a link between the schizonts of *L. simonsi* and the 2 mm. merocytes of *Hepato-cyclus kochi* this *Bulletin* 1948, v 45 683. In the latter the host cell becomes similarly enormously enlarged but the nucleus undergoes repeated divisions instead of growing into a body 190 μ in diameter. The final product is alike in all three parasites, viz. a compressed mass of innumerable bipolar staining merozoites which escape into the blood to form gametocytes.]

P. C. C. GARHAM

HART, J. W. Observations on Blood Parasites of Birds in South Carolina. *J. Parasitology* 1949 Feb v 35 N 1 79-82.

The birds of a district in South Carolina, U.S.A. were examined in winter and summer for the presence of parasites in the blood. 4.9 per cent. showed infections in the winter and 1.6 per cent. in the summer. The following parasites were found: *Plasmodium circumflexum longatum brumpti* and *ridgwayi*, *Haemaphysalis leucorhynchos*, *Trypanosoma* and *Toxoplasma*. The majority of the birds were English sparrows (*Passer domesticus*). Sporozoite rates in the local *Anopheles* have been high, although human malaria cases were uncommon; the possibility of an avian origin had, therefore, to be considered, and these observations provide some evidence that such an origin may have existed.

P. C. C. GARHAM

OESTERLEIN, V. Self-cured ethiod eggs by experimental liver Vogel malaria (Sulphonamide Compounds in Experimental Bird Malaria). *Zentralblatt für Bakteriologie* 1941 A g 1 147 No. 5 339-42, 1 fig. 17 ref.

BLACKWATER FEVER

WEISE, W. Ueber das Pseudo-Methämoglobin (Methaemalbumin) N. II. Fairley. Pseudo-Methaemoglobin (Methaemalbumin) Fairley. Reprinted from *Deutsch. Tierärztl. Wochenschr.* 1941 v 45 No. 7 118-24. 17 ref.

FAIRLEY's demonstration of the rapid development of methaemalbumin on the addition of an alkaline solution of haematin to plasma and heating to 40 C. (this *Bulletin* 1935 32 210 1937 34 84) impressed the author that methaemalbumin is really only haematin dissolved in serum and not the firm chemical compound of haematin and crystallinum that Fairley claimed. The author considers the production of haemochromogen after the addition of concentrated ammonium sulphide in Fairley's blackwater fever cases a proof of this. Since Schumm regarded this reaction as evidence of the presence of haematin (Fairley on the other hand believes Schumm's reaction indicates the presence of the pigment methaemalbumin and not haematin).

The argument in this paper covers much the same ground as Fairley's original communication. The author points out that Schumm's test only

distinguishes haematin from methaemoglobin and that haematin (as indicated by the test) has been found in the blood serum in many pathological conditions, including severe malignant tertian malaria. He confirms HEILMEYER's observation that the spectrum of haematin dissolved in serum differs from that of alkaline watery haematin solution because it is combined with serum protein. In his view this combination is a loose one similar to other physiological combinations of substances with protein, for example "haemolytic" bilirubin. Fairley's pigment need not therefore be regarded as a firm chemical compound, in spite of its behaviour in the ultra-centrifuge or under electrophoresis. The production of haemalbumin on the addition of sodium hydrosulphite to methaemalbumin, as reported by Fairley, he regards as requiring further proof.

He confirms Fairley's observations on the slow production of methaemalbumin in mixtures of the haemoglobin and serum of mammals other than the human being and the ape, and reports his findings in a small series of experiments in which human, dog, rabbit and horse haemoglobins are compared in this respect. After 48 hours' incubation at 37°C the mixtures of haemoglobin and sera all produced methaemoglobin, small amounts in the human mixtures much larger in the others. On the other hand, "haematin" (as estimated by Schumm's test) was produced only in the human and dog mixtures. He suggests that this is because only easily split haemoglobins (such as human and dog) will give rise to haematin in serum. Other more resistant haemoglobins produce methaemoglobin only.

[The physiological and pathological importance of Fairley's observations with regard to methaemalbumin seems to the reviewer to be unaffected by this communication.]

B G Maegraith

KHO LIEN KENG Gestoorte nierfunctie bij zwartwaterkoorts [Disturbed Kidney Function in Blackwater Fever] *Med Maandblad Batavia* 1949, Feb 1, v 2, No 2, 46-51 [29 refs]

The English summary appended to the paper is as follows —

"Three cases of blackwater fever with renal damage are reported. The first patient showed during a week after disappearance of the clinical symptoms, an isosthenuria at a rather normal diuresis. The second patient died anuric.

"The third one produced symptoms of glomerulonephritis after a second attack of blackwater fever. Follow up a year later still showed renal insufficiency (blood-urea 1.078 g/liter, specific gravity of urine 1.004)."

TRYPANOSOMIASIS

VANDERPLANK, F L Studies of the Behaviour of the Tsetse-Fly, *Glossina pallidipes*, in the Field Influence of Climatic Factors on Activity *J Animal Ecology* 1948 Nov, v 17, No 2, 245-60 [17 refs]

The author wishes to investigate the relation between the activity of a tsetse fly, *Glossina pallidipes*, and certain climatic factors. His method, in broad terms, is to tie up an ox and catch the flies that come to it, recording them in fifteen-minute spells throughout the day. At the same intervals he measures temperature, humidity, light and so forth. Conditions for this type of experiment seem to have been good for there is some indication that the tsetse population did not vary greatly over a number of months. If, therefore, differences in the numbers of flies caught were established they were due to differences

in activity one might reasonably try to relate them to climatic factors. Had there been large differences also in the population this work would have been very difficult.

A point of considerable interest is that for several of the physical factors middle values are associated with greater activity of the fly than either high or low values. For instance within the limits of the conditions prevailing where the work was done the insect became more active the brighter the light but only up to a certain point. At midday on bright days the light was too intense and reduced the activity of the flies. The same was true both of humidity (measured by saturation deficiency) and of temperature. In each case there was a critical value above which the activity decreased. For instance for temperatures up to 29°C there was a positive correlation between the dryness of the air and the activity of the insect. But from 30°C upwards the correlation was reversed and became negative so that at the higher temperatures the drier the air the less was the activity of *C. fallax* flies. Throughout the paper full use is made of statistical methods and measures of significance are given.

There is an interesting comparison between the catch of *C. fallax* flies at different hours of the day in the thicket and out on the open hard pan. In the thicket perhaps because the temperature never gets very high and the light at midday is not very bright the insect is active all through the day, indeed equally active all through the day. But outside on the hard pan, there is a great reduction of activity at noon and soon after, except on days when much light is absorbed by dust in the atmosphere or by cloud. It is a matter of some interest that figures collected by other authors in Italian Somaliland and Zululand can on the whole be reconciled with this author's own figures from Tanganyika.

In this paper the author makes use of several modern conceptions about tsetse populations and advances our knowledge of his side of the subject considerably. One might perhaps say that not every point in the argument is equally well established; the reviewer believes that there is one serious statistical misprint which it is not possible for the reader to correct. P. 4 Bottom.

MORRIS K. R. S. & MORRIS M. G. The Use of Traps against Tsetse in West Africa. *Bull. Entom. Res.* 1949 Mar. v. 39 Pt. 4 491-528 5 text figs. & 8 pls. on 2 pls. 16 ref.

The authors describe their work in the Savannah country in the north of the Gold Coast where *Glossina fuscipes* and *C. luckhowskii* are common along river sides. They have not only attempted control by trapping but they have tried to understand the underlying principles. The result is that the paper tells one something about the fly-view of the world and advances our knowledge of the subject considerably. The problem is practical but the authors have not limited themselves solely to practical considerations.

Morris and Morris have tested a number of recognized types of tsetse traps and have developed one which they describe as the Animal Trap. It seems to be a Harris trap but much smaller indeed about the size of a great fly netter incidentally that it is implied that loop and gill are commonly fed upon by these insects which we think not the experience in some other parts of Africa. Under their conditions the animal trap is the most efficient among several types tested. In addition to comparing the effects of different types of trap the authors have described much about the fly, comparing their Animal traps with tsetse fly nets which are well known to be no trap at all. Forward comparison is possible in the case of the trap and perhaps of the fly in its carrying with tsetse. They end their paper by stating that the exact position

in which one places the trap is very important it should be sited in an open feeding ground frequented either by man or animals. If it is placed close to an actual tethered animal, it catches more flies than if it is not.

Much of the authors' work has been done in small "sacred groves" where clearing is not possible for religious reasons. In these groves they have used traps at a density as high as twenty to the acre, but they still find that eradication of tsetse by trapping is not possible. Traps may, however, prove valuable to protect man from fly or sleeping sickness because they will catch a large proportion of the flies, perhaps quite quickly. Moreover the catch is highest in the dry season, when the contact between man and fly is likely to be closest because there are very few water holes and those generally in fly belts.

P. A. Buxton

FERREIRA, T. Os trabalhos de combate à *Glossina* "morsitans", West no Mutuál Relatório anual [Annual Report of the Campaign against *Glossina morsitans* in the Mutuál Region] 68 pp, 5 charts, 4 diagrams & 4 maps. Colónia de Moçambique. Missão de combate às tripanossomíases. I.ª Subsecção de Entomologia. 1948. Lourenço Marques. Imprensa Nacional de Moçambique.

SCHEFF, G. J. & THATCHER, J. S. The Role of Potassium as Cause of Death in Experimental Trypanosomiasis. *J Parasitology* 1949, Feb., v 35, No 1, 35-40 [38 refs]

'The survival time after trypanosome infection was found to be the same in the potassium tolerant and non-tolerant animals, suggesting that the potassium is not the causative agent of death, as recently advocated.'

LABANDERA-GOÑI, H. A proposito del primer caso de enfermedad de chagas comprobado en Florida [The First Proved Case of Chagas's Disease in Florida (Uruguay)] *Arch Uruguayos de Med, Cirug y Especialidades* 1948, Sept-Oct., v 33, Nos 3/4, 119-22.

The English summary appended to the paper is as follows —

A description of the first proven case of Chagas Disease (benign acute edematous unilateral bipalpebral form) in a child, male in sex, domiciled in the Department of Florida [Uruguay] is presented.

WOOD, S. F. Additional Observations on *Trypanosoma cruzi* Chagas, from Arizona in Insects, Rodents, and Experimentally Infected Animals. *Amer J Trop Med* 1949, Jan., v 29, No 1, 43-55, 1 map & 12 figs on pl [13 refs]

This paper reports the results of surveys carried out in Arizona to determine the members of the sub-family *Triatominae* which are naturally infected with *Trypanosoma cruzi*. Incidentally, the first naturally-occurring infections in mammals—substantiated by xenodiagnosis—are also recorded.

The following species of reduviids occurring in the area have been found naturally infected with *T. cruzi*, the two first listed being here recorded as infected for the first time —

Triatoma protracta,
Triatoma protracta woodi,
Triatoma rubida uhleri,
Triatoma longipes

Thirty-nine wild-caught mammals were examined for the presence of trypanosomes in the blood by the fresh film method or in stained slides. Three were found to harbour a "levisi" type of trypanosome.

in activity one might reasonably try to relate them to climatic factors. Had there been large differences also in the population this work would have been very difficult.

A point of considerable interest is that for several of the physical factors middle values are associated with greater activity of the fly than either high or low values. For instance within the limit of the conditions prevailing where the work was done the insect became more active the brighter the light but only up to a certain point at midday on bright days the light was too intense and reduced the activity of the flies. The same was true both of humidity (measured by saturation deficiency) and of temperature. In each case there was a critical value above which the activity decreased. For instance for temperature up to 29 C. there was a positive correlation between the dryness of the air and the activity of the insect. But from 30 C. upwards the correlation was reversed and became negative so that at the higher temperatures the drier the air the less was the activity of *G. pallidipes*. Throughout the paper full use is made of statistical methods and measures of significance are given.

There is an interesting comparison between the catch of *G. pallidipes* at different hours of the day in the thicket and out on the open hard pan. In the thicket perhaps because the temperature never gets very high and the light at midday is not very bright the insect is active all through the day indeed equally active all through the day. But outside on the hard pan there is a great reduction of activity at noon and soon after except on days when much light is absorbed by dust in the atmosphere or by cloud. It is a matter of some interest that figures collected by other authors in Italian Somaliland and Zululand can on the whole be reconciled with this author's own figures from Tanganyika.

In this paper the author makes use of several modern conceptions about tsetse populations and advances our knowledge of his side of the subject considerably. One might perhaps say that not every point in the argument is equally well established: the reviewer believes that there is one serious statistical misprint which it is not possible for the reader to correct. P. A. BURTON

MORRIS H. R. S. & MORRIS M. G. The Use of Traps against Tsetse in West Africa. *Bull. Entom. Res.* 1949 Mar. v. 39 Pt. 4 491-528 5 text figs & 8 figs in pls. 16 r. 6s.]

The authors describe their work in the Kaolakh country on the north of the Gold Coast where *Simulium felse* and *G. tachinoides* are common along river sides. They have not only attempted control by trapping but they have tried to understand the underlying principles. The result is that the paper tells us something about the fly, new to the world and advances our knowledge of the subject considerably. The problem is practical but the authors have not limited themselves solely to practical considerations.

Morris and Morris have tested a number of recognized types of tsetse traps and have developed one which they describe as the Animal Trap. It resembles a Harman trap but is much smaller indeed about the size of a goat. One notes incidentally that it is supposed that sheep and goats are commonly fed upon by these insects which we think is a little experience in some other parts of Africa. Under their conditions the animal trap is the most efficient among several types tested. In addition to comparing the efficiency of different types of trap the authors have devoted much thought to comparing their Animal traps with teams of flies which work in the same area, no straight forward comparison is possible the activity of the trap and perhaps of the fly both varying with season. They find a rather large difference in the

of these gave a positive complement fixation, 190 did not. In 62 the xeno-diagnostic test was carried out [whether from the positive, or negative, or both is not stated] and in five the result was positive. In all those studied similar tests were made—histories, symptoms, physical signs and electrocardiographic findings. The last is the most important from the point of view of this investigation. Among 104 of the 122 giving a positive complement fixation, 34 showed electrocardiographic changes (32.5 per cent), among 176 negative to complement fixation six only showed changes (3.5 per cent). The commonest of these disturbances was premature ventricular contractions and close behind came right bundle branch block and atypical QRS or T wave abnormalities, other lesions observed were prolonged P-R interval and a certain degree of, even up to complete, A-V block.

Other causes of chronic cardiac disease were looked for and in 29 of the 34 patients no other cause could be found, the remaining five had syphilis also, which might account for aortic disease and arteriosclerotic changes. Four of the former died within a year of the observations being made.

H. Harold Scott

LEISHMANIASIS

KIRK, R. *The Differentiation and Nomenclature of Leishmania*. *Parasitology* 1949, Feb., v 39, Nos 3/4, 263-73 [119 refs.]

This paper is itself a review and therefore should be read in the original as it is not possible to condense the contents except in the most general way, which has been attempted here.

An account is given of the early history of the discovery of parasites of the genus *Leishmania*. This is followed by sections dealing with the differentiation of "species" of the genus, based on various grounds, morphological, clinical, serological and otherwise, which are shortly considered below.

Differentiation based on morphology

The comparison of various strains of *Leishmania*, both cultural and in the Leishman-Donovan-body form, have led some workers to consider that differentiation is possible on grounds of size between *L. donovani* and *L. tropica*, while others have distinguished these species by the type of growth in Noller's medium. Still other workers, however, have failed to confirm these distinctions.

Differentiation on clinical and epidemiological grounds

These have been the main grounds on which leishmanial species have been separated, even though they are unsatisfactory from the systematist's point of view. After creation of the genus *Leishmania* for the parasite of Indian kala azar other species were differentiated as similar parasites were discovered to be the aetiological agents in other clinical conditions such as dermal ulcers occurring in the Old and New Worlds (*L. tropica* and *L. brasiliensis*). Further creations were *L. infantum*, *L. nitroica*, *L. peruviana* and others.

Differentiation by results of animal inoculation

The results obtained in this way have been contradictory and inconclusive. *Leishmania donovani*, the parasite of kala azar, may give rise to cutaneous lesions in experimental animals, while *L. tropica*, the parasite of oriental sore, may produce generalized infections. In these cases, again, no uniform results are obtained and the results of infection vary greatly in different strains of the same "species". Similar attempts to differentiate *L. chagasi* of South America from *L. donovani* by animal inoculations fail to pass the test of adequate experimentation.

Of the mammals mentioned sixteen were examined in the laboratory by xenodiagnosis. Four animals proved to be infected but no trypanosomes were found in the blood nor did the tissues at post mortem reveal any parasites [One presumes that the insects used were clean laboratory-bred individuals but it is not stated].

An account is given of various laboratory animals infected experimentally by the various strains of *T. cruzi* coming from reduviid bugs from various localities in the area under survey.

The results obtained included the demonstration of "Leishmania" bodies in muscular tissue.

The usefulness of xenodiagnosis in the detection of naturally-occurring infections is emphasized.

H. F. SAWH

PEREGRINO J. & BERNOTCHIK M. Inquérito sobre doença de Chagas no Hospital da Santa Casa de Misericórdia de Belo Horizonte (Mina Gerais, Brasil) [Cases of Chagas's Disease among Patients in a Hospital in Minas Gerais, Brazil.] *Brasil-Medico* 1948 Sept 4-11 v. 62 Nos 30-37 314-15 English summary

This short article appears to be a part of a fuller work, which, when complete is to form one of the publications issuing from the Oswaldo Cruz. In this it is a summary of results obtained from examining 181 unselected patients at the Santa Casa de Misericórdia Hospital in Belo Horizonte. The examination was thorough and included general physical examination, electrocardiograms, complement fixation with *T. cruzi* culture antigen and any suspicious patient was further subjected to xenodiagnosis and X-ray tests.

Thirty-seven presented indications of infection with *T. cruzi* of 49 with cardiac disturbance 18 were due to Chagas disease, which accounted for six. Of these 18 the majority showed changes in the right bundle of His and of QRS auriculo-ventricular blocks. Just half of those with chronic heart disease due to *T. cruzi* were under 30 years of age whereas four-fifths of those with heart lesions of other origin were over that age. On the whole the complement fixation test was a valuable method of diagnosis (in 31 out of 77 cases) but only eight of the 41 gave a positive result to xenodiagnosis test.

The chief vectors in Minas Gerais were *Triatoma dimidiata* and *T. sordida*. 12 other species of Triatomidae are found in the State but they are not active vectors. Triatomidae are found in 201 of the 316 municipalities of the State and infected persons were found in 143 municipalities. A chart has been drawn up showing the areas most highly infected.

H. H. J. S. GILL

DIAS E. LARA J. L. S. & PEREGRINO J. F. Estudo de uma importância social da doença de Chagas. I. Inquérito epidemiológico feito nas circunstâncias de Bambuí, Oeste de Minas. Studies of the Social Importance of Chagas's Disease. I. Investigation carried out in the Environs of Bambuí, Western Minas Gerais. *Brasil-Medico* 1949 Nov 4-11 v. 63 Nos 45-51 & 53-61 13 English summary

The evidence afforded by this investigation demonstrates very clearly the large part which infection with *T. cruzi* plays in producing cardiac disease in this district at all events. Studies in other districts will have to be made to see whether this applies in them also.

The authors examined persons engaged in the railways including members of their families altogether 312 individuals. One hundred and twenty-two

re 7 species of *Phlebotomus* in Colombia, namely *P. squamiventris*, *evansi*, *anamensis*, *monticolus* var *incanum*, *colombianus*, *osornoi* and *longipalpis*. The dog is probably the reservoir host and inoculation of dogs with human material produces lesions identical with the human disease and the sera of dogs with visceral localization give the same results as human sera. But the question of the dog being definitely the reservoir host is not yet proved, though no other animal seems to be likely.

For treatment the author uses diphosphate of chloroquinoline [chloroquine]. In solution this is stable at pH 4-6.5 and withstands a temperature of 21°C for 40 minutes, above pH 6.5 it decomposes. It is a white crystalline powder, with acrid, bitter taste. After experimental tests on rats, rabbits, dogs and monkeys the author tried the drug in human patients in the following doses *per os*. For very serious cases with extensive lesions, multiple and with perforation of the nasal septum, first day, 1 gm at 8 a.m., 0.5 gm at 3 p.m., second day, 0.5 gm at 8 a.m. and 3 p.m., third day, 0.5 gm at 8 a.m. and 0.25 gm at 3 p.m., altogether 3.25 gm. In cases of less severity, the dosage for the first day is the same, but on the two following days 0.5 gm at 8 a.m. only, a total of 2.5 gm.

Twenty-one patients have had this treatment, 10 are completely cured and their lesions cicatrized, 3 are much improved with diminution of the lesions, less secretion, less itching and local pain, 3 others had improved markedly when they left and could not be followed up. 3 more are at present under treatment and "show appreciable improvement", 2 have not responded to the treatment.

The author concludes that the results of this new treatment by oral administration of diphosphate of chloroquine are better than those from any of the drugs hitherto used, the toxicity is low in contrast with the antimonials, it is given *per os* and patients can be up and about and the cost is less than that of drugs previously used. [The doses of chloroquine appear to be high, compared with standard doses, used in the treatment of malaria.]

H. Harold Scott

FEVERS OF THE TYPHUS GROUP

WEYER F. Vergleichende Untersuchungen an Rickettsien [Investigations into the Relationships of the Rickettsiae]. Reprinted from *Ztschr. f. Naturforsch.* 1947, v. 2b, Nos. 9/10, 349-58. [14 refs.]

For four years the author has been investigating the rickettsiae of the louse-typhus (*Läusefleckfieber*) and flea-typhus (*Flohstreckfieber*) groups. Details of the studies, including the technical methods employed, are given in other recent papers [see also this *Bulletin*, 1949, v. 46, 537 and below].

The present paper consists chiefly of a long discussion of the remarkable variations observed in the habit of growth and virulence of *Rickettsia prowazekii* and *R. mooseri*, both of which in laboratory conditions have often been observed to become extracellular and at the same time non-virulent for lice and mice. The modified types may even be indistinguishable from the rickettsiae which are naturally extracellular and non-virulent for mice, viz., *R. uolynica*, *R. pediculi*, and *R. weigli*.

Cross immunity tests

Without going into details of the results of cross immunity experiments cited, it may be said that here also there is a lack of agreement in the results obtained by various workers. Thus some writers maintain that a previous infection with *L. donovani* confers immunity against *L. tropica* but others have been unable to confirm this.

Serological Tests

These have comprised attempts to produce specific agglutinating sera, complement fixation tests, the Ruckenberg (adhesion) phenomenon and other techniques. Results by different workers have been contradictory and inconclusive in so far as the differentiation of "species" by these means is concerned and the impression gained by experienced workers is that the clear-cut results originally claimed when a few strains only were studied experimentally become obscured when a larger number of strains is studied.

Veno-differentiation

This term has been coined to indicate the different behaviour of strains of *Leishmania* in different species of *Phlebotomus*. In a species of *Phlebotomus* which is the vector of a strain of *Leishmania* the parasites develop in the anterior station but at best there is not at present sufficient accurate information to make this an easy or definite means of separating strains.

The implications of the various studies mentioned above are discussed in relation to the morphological basis of zoological nomenclature and it is pointed out that the taxonomic status of biological races has not been defined by systematists. In spite of this it is considered justifiable to recognize three species of *Leishmania*: 1. *L. tropica*, 2. *L. donovani* and 3. *L. braziliensis* on account of the clinical differences exhibited in the infections caused by these parasites which have been under close observation for 50 years and has not changed their characters in spite of the innumerable parasitic generation which such a lapse of time implies. It is felt that such consistent behaviour implies corresponding biological differences in the parasites, which are hereditary and stable. The last section of the paper deals with the synonymy of the species of *Leishmania* occurring in man.

H. E. Shortt

RAGHUNATH P. Kala-azar: Report of a Case of Local Origin. *India Physician* 1949 Jan. v 8 No. 1, 3-5

Another case from Bombay [see this Bulletin 1948 45 317]

ATLAS M. DE THIERY R. & ZERM TL. Un nouveau cas de kala-azar traité par le 2168 RP. [A New Case of Kala Azar treated by 2168 RP] *Alcitra Méd* 194 Apr No 4 345-9

PUEZLO GARCIA, M. J. Leishmaniasis. [History of Leishmaniasis in Colombia.] *Rev. Facul. de Med. Bogotá* 1949 Jan v 17 N. 7 738-59

The first part of this article gives a sketch of the history of mucocutaneous leishmaniasis, locally known as *puerca* or *Marran* (literally, *poor* or *worse* but used as an adjective to anything foul or dirty in Colombia from the first published description of a case in a boy 11 years old in July 1900. In the early days it was regarded as either syphilitic or a suppurative, leprous lesion, and only at the end of the century were the differences noted between cutaneous leishmaniasis and cancer, scrofula, syphilis and other diseases. It was not until 1944 that a case was recognized by Dr. A. Gait Gal as such. The first case of visceral leishmaniasis in Colombia.

The author next notes the Colombian endemic foci of the disease and mentions nearly a score of them and then lists the possible transmission of the

- GIROUD, P & CIACCIO, G Inoculation de *Rickettsia prowazeki* et *mooseri* chez les poissons Contrôle sérologique et immunité provoquée [Inoculation of Fish with *Rickettsia prowazeki* and *R mooseri* Serological Results] *C R Soc Biol* 1948, Dec, v 142, Nos 23/24, 1478-9

The following is a translation of the authors' summary —

Different fish may be infected with rickettsiae of epidemic typhus and react with the formation of agglutinins The murine strain seems to be more adaptable than the epidemic At least two passages can be maintained with the two strains, through the gills or other organs The use of the liver or peritoneal organs, however, seems to be preferable

[See also this *Bulletin*, 1949, v 46, 451] *H J O'D Burke-Gaffney*

- MITTERMAIER, R Die Erkrankungen des Ohres beim Fleckfieber [Diseases of the Ears in Typhus Fever] *Deut med Woch* 1948, Mar 12, v 73, Nos 9/12, 109-11

The author discusses in general terms the various complications of typhus fever that are associated with the organs of hearing He believes that if all the minor degrees of deafness are included 80 per cent of the patients may suffer from auditory troubles He deals specially with septic infections of the middle ear, which usually appear about the 16th to the 18th day He estimates that as many as 15 per cent of patients with severe attacks may be affected, and he stresses the need for close observation of the patients with a view to early treatment of a complication which may have disastrous results

John W D Megaw

- PFEFFER, K H Über Störungen der vegetativen Regulationen in der Fleckfieberkonvaleszenz [Disturbances of the Sympathetic Regulating Mechanism in Typhus Convalescents] *Deut med Woch* 1948 Dec 3, v 73, Nos 45/46, 596-8, 3 charts

- GOOD N E & KOTCHER, E Murine Typhus Fever in Louisville, Kentucky *Pub Health Rep* Wash 1949, Feb 25, v 64, No 8, 229-37, 1 map

In the present study, sera of 793 inhabitants of Louisville, Kentucky, yielded only three complement-fixation reactions against murine antigen at a titre of 1-4 Sera of 351 rats yielded only one positive reaction at a titre of 1-8

In 27 per cent of the rats caught in the market and business areas of the city *X cheopis* were found

The findings did not tend to justify the suspicion that murine typhus had extended to a significant degree as far north as Louisville

John W D Megaw

- AKLE DELGADILLO, J & PÉREZ REBELO, R Existencia de tifo murino en Cd Camargo, Chihuahua, Rep Mex [The Presence of Murine Typhus in Camargo, Chihuahua] *Rev Inst Salubridad y Enfermedades Trop Mexico* 1948, Sept, v 9, No 3, 195-7

The English summary appended to the paper is as follows —

'1 350 Weil-Felix's tests were performed with human sera from Ciudad Camargo, Chihuahua, two of which were positives

'2 These two positives sera fixed the complement with antigen of murine, and not with that of classic typhus

'3 These results prove, first time, the presence of murine typhus in Ciudad Camargo, Chihuahua, Mex'

In several cases the modified types have reverted to the original type and have again become intracellular and virulent though it has not been found possible to devise a method by which the reversal can be produced with uniform success.

Among the conditions in which changes in type have occurred are — (1) the maintenance of strain by the customary laboratory method (2) intracoeleomic inoculation of ticks (3) transmission through ticks, flea and weevil larvae and (4) storage for long periods of dried infected faeces of arthropods.

The author states that both *R. prowazeki* and *R. m. neri* may be so variable in laboratory conditions that the differences observed among individual strains of either organism can be greater than the differences usually relied on to distinguish between the two species of rickettsiae.

It is regarded as an open question whether the changes are due to inherent mutability of the organisms or to the simultaneous occurrence of intracellular and extracellular types, one or other of which predominates when environmental conditions become favourable for its development.

[The possible bearing of the mutability of the rickettsiae on changes in virulence of typhus infection during epidemics and on the carrier of infection between epidemics is regarded as a subject for speculation.]

Complement fixation and mouse-protection tests might throw light on the question whether important qualitative changes have occurred in the antigenic and immunological properties of the modified strains of rickettsiae. Most of the changes in type seem to have occurred in very artificial conditions; this factor must be taken into account when attempting to assess the bearing of the findings on the problems of human typhus. Jah B. D. Meyer

WEYER F. Die künstliche Infektion von Zecken mit Rickettsien und anderen Krankheitserregern. [Artificial Inoculation of Ticks with Rickettsiae and other Disease Agents.] *Zeits. f. Rat. I. Med. Orig.* 1948 v. 152 449-57.

Various tick species, especially *Ornithodoros moubata* were successfully inoculated by the intracoeleomic route with suspension containing *Rickettsia m. neri*, *R. prowazeki* and *R. wolkyi* etc. The agent of atypical bronchopneumonia or benign bronchopneumonia (Hersberg) was also cultivated in the same way. [Apparently this was *R. burnetii* see this *Bullet.* 1949 48 511.]

Attempts were made without success to cultivate the virus of mouse bronchopneumonia and influenza. In the abstract in English the influenza virus is wrongly referred to as the 'Influenza bacillus'.

Technical details are given of a large number of these experiments.

Only one out of three attempts to cultivate *R. andersoni* was successful. In this case tick suspension made 60 days after inoculation was infective to mice by the intrarectal route.

Four out of five strains of *R. prowazeki* were cultivated in ticks. One pair was of which were found infective to mice as mice test made at intervals ranging from 14 to 28 days after inoculation. Two of the strains became extracellular and non-pathogenic for mice after passage through the tick but one of these resumed the intracellular habit of growth and virulent for mice after three passages through lice. The other remained extracellular and non-pathogenic to mice after isolation from the eggs of the uninfected tick and later passage through lice.

In 15 sets of experiments with *R. m. neri* 13 positive results were obtained. In some cases intracellular strains were used and several of these became extracellular and non-virulent for mice. In other cases extracellular strains became intracellular and regained their virulence. Jah B. D. Meyer

The methods of diagnosis included (1) intraperitoneal inoculation of mice with sputum of patients, (2) inoculation of mice with blood, (3) inoculation of guinea-pigs, followed by transfer through mice and ticks, (4) feeding of ticks, followed by transfer through mice, (5) feeding of lice followed by transfer through mice

Complement-fixation tests could not be carried out because enough antigen was not available, but there seems to be no doubt regarding the nature of the disease

The most likely mode of infection was thought to have been inhalation of infected dust

John W D Megaw

COMBIESCO, D & DUMITRESCO, N *Survie in vitro de Rickettsia burneti de la fièvre Q en Roumanie* [Survival in vitro of *Rickettsia burneti* in Rumania] *Ann Inst Pasteur* 1949, Jan, v 76, No 1, 79-80

A number of blood samples were collected from guinea-pigs infected with *Rickettsia burneti* isolated in Rumania, and after clotting were covered with a layer of a mixture of oil and vaseline. The samples were kept at room temperature and tested at intervals by guinea-pig inoculation. Typical febrile reactions were caused in animals tested up to eight months, and a mild reaction occurred in an animal tested nearly 300 days after the preparation of the sample. After 11 months the blood became laked though it was still free from bacterial contamination, it produced no definite reaction in the guinea-pig that was tested

John W D Megaw

COMBIESCO, D, COMBIESCO, Cornelia, DUMITRESCO, N, POPESCO, C & ZARNEA, G *Diagnostic rétrospectif par la réaction de fixation du complément d'un foyer roumain de fièvre Q* [Retrospective Diagnosis of Q Fever in Rumania by the Complement-Fixation Reaction] *Ann Inst Pasteur* 1949, Jan, v 76, No 1, 81-2

In March and April 1947, nine persons employed at the antirabic section of the Institute of Serology of Constanza, Rumania, were attacked by a fever which could not be diagnosed at the time. All the patients had been engaged two to three weeks before the onset, in one capacity or another, in shearing sheep which had come from the neighbouring area. Seven of the patients were attacked between March 28th and April 6th, the other two were attacked on April 11th and 23rd, respectively.

[The interest of the outbreak consists in its being the first to be recognized in Rumania, rather than in the retrospective diagnosis which was made by the complement-fixation test early in May, of the same year.]

John W D Megaw

WEYER F *Ueber Rickettsia wolhynica und die Diagnose des Wolhynischen Fiebers durch den Läuseversuch* [*Rickettsia wolhynica* and the Diagnosis of Trench Fever by the Louse Test] *Zent f Bakt* I Abt Orig 1948, v 152 403-14 [15 refs]

In 47 out of 146 cases of trench fever *R. wolhynica* was isolated from batches of lice which had been allowed to feed on the patients. In a number of cases the diagnosis could not have been made with certainty on clinical grounds. Scanty, yolk-sac cultures were obtained in some cases from suspensions of the infected lice and the cultures were sometimes infective for lice by intrarectal inoculation but it was not found possible to maintain the organisms by serial yolk-sac cultures.

SMADAL, J. E. JACKSON, Elizabeth B. LEY, H. L., Jr & LEWYTHWAITE, R. Comparison of Synthetic and Fermentation Chloramphenicol (Chloromycetin) in Rickettsial and Viral Infections. *Proc. Soc. Exper. Biol. & Med.* 1949 Feb 70 No 2, 191-4 2 figs. [11 refs.]

Chloromycetin formerly prepared only from the mould *Streptomyces rivecourtii* has recently been produced synthetically and has been found to have the same physical and antibacterial properties as the fermentation product. The synthetic drug has now been found by the authors to be as effective as the original type in prolonging the life of embryo chicks infected with *Rickettsia rickettsii*, *R. akari*, *R. mooseri*, *R. prowazekii*, *R. tsutsugamushi*, psittacosis virus and a strain of lymphogranuloma virus.

In two batches each of 8 mice the synthetic drug was almost equally effective in preventing death after inoculation with about 40 lethal doses of *R. tsutsugamushi*.

In two cases of scrub typhus the synthetic drug produced the same dramatic improvement in the patients' condition as had been observed in other cases treated by the fermentation product.

Johs H. D. Meyer

SMADAL, J. E. Evaluation of New Drugs in the Treatment of Rickettsial Diseases. *Bol. Oficina Sanitaria Panamericana*. 1949 Jan., v 23, No 1 1-19 11 figs. [19 refs.]

This is a succinct review of recent work on para-aminobenzoic acid and chloromycetin the latter of which is now recognized as being remarkably effective in the treatment of the fevers of the typhus group transmitted by lice, fleas, ticks and mites.

Johs H. D. Meyer

BENIXSON, J. & ANGSTADT, L. Some Observations on the Effect of Cytochrome C in Rickettsial Infections. *Tex. Reports on Biol. & Med.* 1948, v 6 No 4 484-92 [14 refs.]

1. The apparent lengthening of the incubation period of Rocky Mountain spotted fever in guinea pigs following intraperitoneal infections of cytochrome C of varying concentrations as indicated has been postulated as being a nonspecific physiologic effect or a protein effect or both.

2. Cytochrome C therapy begun on the day of fever in typhus and Rocky Mountain spotted fever in relatively large doses for two consecutive days did not alter the course of the fever.

HUBNER, R. J. JELLINEK, W. L. & DECK, M. D. Q Fever—a Review of Current Knowledge. 4. *Intern. Med.* 1949 Mar 30 v 3 493-509 93 ref.]

NACK, E. G. & WEYER, F. Laboratoriumsinfektionen bei Q Fieber (Laboratory Infection with Q Fever. *Deut. med. Woch.* 1949 Feb 18 v 74 No 7 193-702, 2 figs. 1 ref.]

In the course of the investigation previously described this fall of 1948 v 48-541 a laboratory outbreak of Q fever occurred at the Hamburg Tropical Diseases Institut. During a period of three months beginning November 21 1947 seven confirmed and four probable cases occurred and in a footnote mention is made of two further confirmed cases.

The outbreak, which is described at length appears to have been entirely the laboratory outbreak already reported from the U.S.A. and Austria. *Rickettsia* were isolated and detected microscopically in sera and animals from animals and arthropods inoculated with the blood of four patients.

YELLOW FEVER

STEFANOPOULO, G J & DUVOLON, S Réactions observées au cours de la vaccination contre la fièvre jaune par virus atténué de culture (souche 17 D) A propos de 20 000 vaccinations pratiquées par ce procédé à l'Institut Pasteur de Paris (1936-46) [Reactions during Yellow Fever Vaccination with Attenuated 17 D Virus in 20,000 such Vaccinations in the Pasteur Institute Paris in 1936-46] *Bull et Mém Soc Méd Hôpît de Paris* 1947, Nos 32/33, 990-1000 [26 refs]

In this review of 10 years' experience of inoculation with the yellow fever vaccine the authors draw particular attention to the lack of harmful reactions in the recipients of the chick embryo vaccine containing the attenuated strain 17D of yellow fever virus. The neurotropic mouse brain vaccine has produced some severe reactions affecting the nervous system particularly in some cases, but they observed no bad reaction in 2,470 infants aged 15 days to 10 years who received the 17D vaccine. The neurotropic mouse brain vaccine has also been known to cause severe reactions in persons past middle age but the authors have seen no severe reactions in 1,500 people aged 45 to 88 who received the 17D vaccine.

The authors have tended to refrain from giving other injections in the week preceding and week following the yellow fever vaccine inoculation.

They draw particular attention to the necessity to ensure beforehand that those to be injected are not sensitive to egg protein. *F O MacCallum*

DENGUE AND ALLIED FEVERS

SABIN, A B & YOUNG, I A Complement Fixation Test for Dengue *Proc Soc Exper Biol & Med* 1948, Dec, v 69, No 3, 478-80

The antigen used was extracted with benzene from the brains of 3-14-day-old mice inoculated intracerebrally with a Hawaii strain of dengue virus which had been greatly exalted in virulence by repeated passages through mice of three to four days old. With this antigen complement-fixation titres of 1-64 to 1-256 were observed within two to six weeks of inoculation, in human volunteers, rhesus monkeys, and chimpanzees, infected with the homologous strain of human virus. The reaction persisted for many months, titres ranging from 1-4 to 1-16 were observed up to 52 months after infection. Human volunteers inoculated with immunologically distinct strains of human virus gave titres of 1-16 or less, and within six months the reactions became negative. These volunteers developed little or no neutralizing antibody for the Hawaii virus, neither did rhesus monkeys inoculated with the same strains though they gave complement-fixation titres as high as 1-512, but even at the lowest titres the reactions were incomplete (2-3 plus) and they became negative 6-10 weeks after inoculation. On the other hand a rhesus monkey inoculated with the Hawaii strain developed neutralizing antibodies at high titres though the complement-fixing titre was only 1-16 against the homologous antigen.

Human volunteers inoculated with a live vaccine made from mouse-adapted Hawaii virus became immune to unmodified human virus though the complement-fixation test remained negative.

Sera of persons who had been attacked by dengue two years previously in Hawaii, Japan, Singapore, Java, and New Guinea, contained high-titre neutralizing antibodies against the Hawaii virus and also gave complement-fixation

The louse suspensions were not infective to mice by intranasal or other routes. Transfer of the rickettiae to headlice and tick (*Ornithodoros* spp.) were made by methods already described by the author [above].

Dried faeces of infected lice were still infective by intrarectal inoculation for body lice after storage for 2½ years.

John H. D. Meyer

BARTONELLOSIS

SILVA PYRALTA, P. Un caso de neuro-bartonelosis. Tratado por penicilina. A Case of *Bartonella* Infection with Nervous Symptoms. *Rev. Med. Peruana* 1948, Oct. 1, 21 No 238 641-50

The patient a girl of 15 years was taken ill with a general feeling of malaise and intense fronto-occipital headache accompanied by tinnitus. Her temperature on the third day was 38°C. She also complained of acute epigastric pain with nausea which, however soon left her to return again 3 weeks later and again disappear. On or about the 14th day of disease she had wandering pains in the bones and became progressively weaker so that after 4 days she could not leave her bed—the left leg felt cold and numb vision became blurred, people appeared like shadows and she was very breathless. She lost a considerable amount of weight.

Clinically she was thin and pale, respiration 35 per minute, pulse 140. Muscles tender especially those of the neck, lips tremulous. Deep reflexes were exaggerated (they are usually said to be diminished or even lost in the severe anaemia of *Carrión's disease*). There was no change in sensation. A functional presystolic bruit was heard over the aorta, the pulmonary and the tricuspid areas but not propagated, lungs normal. There was slight enlargement of the cervical, inguinal and femoral glands which however were painless and mobile. Blood examination: red cell 850,000 (next day 895,000) leucocytes 10,950 (11,350 next day) per cmm and 60 per cent. 11 the red cells showed *Bartonella* there were anisocytosis and poikilocytosis and 16 per cent. were normoblasts.

Treatment with penicillin was started on the first day that the patient came under the author's observation the 24th day of disease. She was given 30,000 units every three hours intramuscularly. Four days later when 600,000 units had been given the red cells had increased to 1,390,000 and the white reduced to 7,950 and *Bartonella* were no longer seen in the blood. Improvement was uninterrupted and 10½ weeks after the treatment was started blood examination showed red corpuscles 4,400,000 leucocytes 7,950 per cmm. The reflexes became normal, vision improved in a fortnight and was normal in 3 weeks, and helped by passive movement the muscular weakness cleared up. During the penicillin 5 million unit in all the patient received liver extract, vitamin C 500 mgm and vitamin A 100 mgm daily.

H. H. Reid & A.

Hoplopsyllus anomalus, these were believed to have transmitted infection from ground squirrels to the rats and also from rat to rat, because the other fleas found on the rats were the relatively poor vector, the mouse flea (*Leptopsylla segnis*) and a few fleas of the species *Nosopsyllus fasciatus*

No rat fleas were found on any of the 53 squirrels taken in the vicinity of the ranch so that transmission from rat to squirrel was regarded as having been unlikely to occur

In view of the findings the authors stress the necessity for effective rat control in places where plague occurs among wild rodents

The paper contains a great deal of documented information regarding the rodents and fleas known or suspected as agents in the transmission of epizootic plague in the U S A

John W D Megaw

CHOLERA

GALLUT, J Contribution à l'étude de l'antigène thermostable du vibron cholérique Applications pratiques de l'analyse antigénique O [Study of the Thermostable Antigen of the Cholera Vibrio and its Practical Applications] *Ann Inst Pasteur* 1949, Feb, v 76, No 2, 122-35, 1 fig

The author undertook an antigenic analysis of a series of vibrios, including those isolated during the epidemic in Egypt in 1947, on the lines followed by BURROWS, MATHER, MCGANN and WAGNER [this *Bulletin*, 1947, v 44, 422] who had distinguished a total of 13 different antigenic fractions in their collection of cholera and non-cholera vibrios The group antigen of *V. cholerae* had been designated A and the major specific factors of the Ogawa and Inaba types B and C respectively The additional 10 fractions were D to M

Out of 82 strains examined by the present author 61 were classified as agglutinable and 21 as inagglutinable vibrios The first group consisted of —

35 Egyptian strains (1947)—34 Inaba, 1 atypical
14 established laboratory cultures—4 Inaba, 8 Hikojuma, 2 Ogawa
12 El Tor strains—2 Inaba, 10 Hikojuma

The atypical Egyptian strain contained the A antigen only

The second group of inagglutinable vibrios could not be classified and were considered to be non-cholera vibrios

The strains examined by means of monospecific or bispecific sera for the different fractions, prepared by absorption, gave the following results —

Antigen	61 agglutinable strains %	21 inagglutinable strains %
A	100	0
B	32	47
C	95	14
D	45	19
E	47	9
F	26	0
G & J	16	19
H & M	3	4
I & K	18	9
L	47	28

titres of 1-16 to 1-84. Other persons 11 months after attacks of dengue in Guam, had no significant neutralizing antibodies against the Hawaiian virus, and their fixation titres were 1-2 to 1-8.

Volunteers infected with sandfly fever virus gave negative complement fixation reactions against the Hawaii antigen. Rhesus monkeys infected with the French neurotropic yellow fever virus also gave negative reactions seven weeks after inoculation but 8-10 days after large "booster" doses of the neurotropic or the Asiatic viscerotropic yellow fever virus they gave positive reactions at titres of 1-4 to 1-32. This result was regarded as evidence of an antigenic if not an immunological relationship between the viruses of dengue and yellow fever.

(The picture is greatly confused by the occurrence of antigenetic and immunological difference in the strains of dengue virus.) John W. D. Meyer

PLAGUE

FRANCIS E. Twenty-Five Year Survival of a *Pasteurella pestis* Culture without Transfer. *Publ. Health Rep. Wash.* 1949 Feb. 5 v. 64 No. 8 239-40

In 1923 a set of 48 slope cultures of virulent *Pasteurella pestis* was prepared on beef infusion agar and stored at 5-10 C. In 1943 subcultures were made and 33 of these gave luxuriant growths. The original cultures found alive were again examined in 1948 and 25 were still alive. Subcultures made from them caused febrile reaction in guinea-pigs after subcutaneous inoculation and the three animals that died showed typical lesions of acute plague including the presence of numerous bacilli in smears of the spleen and lymph glands. The agar reactions were exactly the same as those observed in 1923 and intermediate to the

The maintenance of a liberal supply of water for condensation was considered important. Tight-fitting cork stoppers, which had just been dipped in a mixture of paraffin oil and vasoline were used.

The surviving 25 cultures and a set of 40 subcultures made in 1941 are being stored for use in future years. John W. D. Meyer

MEYER, K. F. & HOLDEMEYER, R. Rodents and Voles in a Plague Epizootic in a Rural Area of California. *Puerto Rico J. P. H. Health & Trop. Med.* 1949 Mar., v. 4 No. 3 701-9. [Refer in footnotes.] (Spanish version 710-20)

The authors state that the observation made in this study conclusively prove for the first time that plague may be spread from wild to domestic rodents.

In April 1944 rats were reported to be dying in unusual numbers on a ranch near Santa Paula in California. A thorough ecological investigation was promptly carried out in the area. The most significant observations were a) Plague infection was demonstrated in four out of 15 tame pool mice from 42 *Rattus norvegicus* and in two out of three specimens of *R. norvegicus*. Only three ground squirrels were found surviving on the ranch infection was found in two of these and also in one cottontail rabbit.

Infection was found in three of 10 pool mice from 14 *Bea* collected from 40 of the rats in pools (23 *Bea* from house mice and in a pool of four *Bea* from a harvest mouse).

The *Bea* *Caryacus* kept was completely absent. One-quarter of the *Bea* found on rats were the ground squirrel *Bea*. *Dipodomys deserti* and 1

Hoplopyllus anomalus, these were believed to have transmitted infection from ground squirrels to the rats and also from rat to rat, because the other fleas found on the rats were the relatively poor vector, the mouse flea (*Leptopsylla segnis*) and a few fleas of the species *Nosopsyllus fasciatus*

No rat fleas were found on any of the 53 squirrels taken in the vicinity of the ranch so that transmission from rat to squirrel was regarded as having been unlikely to occur

In view of the findings the authors stress the necessity for effective rat control in places where plague occurs among wild rodents

The paper contains a great deal of documented information regarding the rodents and fleas known or suspected as agents in the transmission of epizootic plague in the U S A

John W D Megaw

CHOLERA

GALLUT, J Contribution à l'étude de l'antigène thermostable du vibron cholérique Applications pratiques de l'analyse antigénique O [Study of the Thermostable Antigen of the Cholera Vibrio and its Practical Applications] *Ann Inst Pasteur* 1949, Feb, v 76, No 2, 122-35, 1 fig

The author undertook an antigenic analysis of a series of vibrios, including those isolated during the epidemic in Egypt in 1947, on the lines followed by BURROWS, MATHER, MCGANN and WAGNER [this *Bulletin*, 1947, v 44, 422] who had distinguished a total of 13 different antigenic fractions in their collection of cholera and non-cholera vibrios The group antigen of *V. cholerae* had been designated A and the major specific factors of the Ogawa and Inaba types B and C respectively The additional 10 fractions were D to M

Out of 82 strains examined by the present author 61 were classified as agglutinable and 21 as inagglutinable vibrios The first group consisted of —

35 Egyptian strains (1947)—34 Inaba, 1 atypical
14 established laboratory cultures—4 Inaba, 8 Hikojima, 2 Ogawa
12 El Tor strains—2 Inaba, 10 Hikojima

The atypical Egyptian strain contained the A antigen only

The second group of inagglutinable vibrios could not be classified and were considered to be non-cholera vibrios

The strains examined by means of monospecific or bispecific sera for the different fractions, prepared by absorption, gave the following results —

Antigen	61 agglutinable strains %	21 inagglutinable strains %
A	100	0
B	32	47
C	95	14
D	45	19
E	47	9
F	26	0
G & J	1 6	19
H & M	3	4
I & K	18	9
L	47	28

titres of 1-16 to 1-64. Other persons, 11 months after attacks of dengue in Guam, had no significant neutralizing antibodies against the Hawaii virus and their fixation titres were 1-2 to 1-8.

Volunteers infected with sandfly fever virus gave negative complement fixation reactions against the Hawaii antigen. Rhesus monkeys infected with the French neurotropic yellow fever virus also gave negative reactions seven weeks after inoculation but 8-10 days after large "booster" doses of the neurotropic or the Aichi viscerotropic yellow fever virus they gave positive reactions at titres of 1-4 to 1-32. This result was regarded as evidence of an antigenic if not an immunological, relationship between the viruses of dengue and yellow fever.

[The picture is greatly confused by the occurrence of antigenetic and immunological differences in the strains of dengue virus.] *John W. D. Meyer*

PLAGUE

FRANCIS E. Twenty-Five Year Survival of a *Pasteurella pestis* Culture without Transfer. *Pub Health Rep Wash.* 1949 Feb. 25 v. 64 No. 8 233-40

In 1923 a set of 49 slope cultures of virulent *Pasteurella pestis* was prepared on beef infusion agar and stored at 5-10°C. In 1948 subcultures were made and 33 of these gave luxuriant growths. The original cultures found all were again examined in 1948 and 25 were still alive. Subcultures made from them caused febrile reactions in guinea-pigs after subcutaneous inoculation and the three animals that died showed typical lesions of acute plague including the presence of numerous bacilli in smears of the spleen and lymph glands. The serum reaction was exactly the same as those observed in 1923 and intermediate tests.

The maintenance of a liberal supply of water of condensation was considered important. Tightly fitting cork stoppers which had just been dipped in a mixture of paraffin and tallow were used.

The surviving 25 cultures and a set of 40 subcultures made in 1954 are being stored for test in future years. *John W. D. Meyer*

BLEYER R. F. & HOLDBENYEN R. Rodents and Fleas in a Plague Epizootic in a Rural Area of California. *Puerto Rico J. Pub Health & Trop Med.* 1949 Mar. v. 4 No. 3 201-9 [Refs. in footnotes.] [Spanish version 210-21]

The authors state that the observations made in this study conclusively prove for the first time that plague may be spread from wild to domestic rodents.

In April 1948 rat war report 1 to be dying in unusual numbers on a ranch near Santa Paula in California. A thorough ecological investigation was promptly carried out in the area. The most significant observation was a folk as plague infection was demonstrated in 1 rat out of 15 (live pool made from 47 *Rattus rattus* all saved) and in two out of three specimens of *R. norvegicus*. Only three ground squirrels were found very many on the ranch infection was found in two of these and also in one cottontail rabbit.

Infection was found in three of 10 pool made from 147 fleas collected from 49 of the rats in pool of 28 fleas from house mice and in a pool of 1 rat flea from a harvest mouse.

The flea *Xenopsylla conformis* was completely absent. One-quarter of the fleas found on rats were the ground squirrel flea *Diomus montanus* and

Amoebic dysentery in which vegetative <i>E histolytica</i> was the sole agent found	52
Cases failing to respond to sulphaguanidine and in which <i>E histolytica</i> was found later	2
Cases failing to respond to sulphaguanidine and treated as amoebic dysentery without proof	1
Balantidial dysentery	13
Pure bacillary infections —	
<i>Shigella flexneri</i>	353
„ <i>schmitzi</i>	49
„ <i>sonnei</i>	97
„ <i>shigae</i>	19
„ <i>boyd</i>	22
Mixed dysentery —	
<i>E histolytica</i> and <i>Sh flexneri</i>	3
„ and <i>Sh boyd</i>	2
<i>Balanidium coli</i> and <i>Sh flexneri</i>	2
„ and <i>Sh sonnei</i>	2
Bacillary type cases with negative culture responding to sulphaguanidine	698
Admitted late without laboratory investigation and responding to sulphaguanidine	115
TOTAL	1 430

In the search for carriers the following procedure was adopted. Each patient was detained in hospital after the cessation of sulphaguanidine therapy, the next stool was then cultured and the patient discharged without waiting for the result. Those found positive were readmitted and given a course of 100 gm of the drug. All were then found to be free of infection.

The table of carriers is as follows —

Organism	Carriers	Total Recorded	Percentage of Total
<i>Sh flexneri</i>	21	358	5.9
„ <i>sonnei</i>	8	99	8.1
„ <i>schmitzi</i>	2	49	4.1
„ <i>shigae</i>	1	19	5.3
„ <i>boyd</i>	3	24	12.5
TOTALS	35	549	—

Amoebic dysentery was treated with sulphaguanidine (4 gm every four hours to a total of 20 gm), followed by 10 days of emetine (1 grain daily) and five days of quinoxyl (0.25 gm three times daily by mouth and a retention enema of 5 gm in 200 cc of saline each evening). Seven patients relapsed within a year.

Bacillary dysentery was treated with sulphaguanidine (4 gm every four hours night and day) until patients were afebrile and symptomless. The dosage for the different groups is analysed in a table and the average requirement for each group is given.

The only significant complication was acute hepatitis, which occurred in 10 cases. There were no deaths in the series.

P. Manson-Bahr

The majority of the strains possessed 3 or 4 of the antigens.

As the A antigen was present in all the agglutinable strains examined and absent from all the non-agglutinable strains the author concludes that the demonstration of its presence regardless of the titre of agglutination, is necessary and sufficient for the diagnosis of *V. cholerae* the El Tor vibrios, which do not show any difference in antigenic structure from the cholera vibrios being differentiated by the usual haemolytic test. The demonstration of the B and C antigens serve to distinguish the Ogawa, Inaba and Nikojima types, but only if present along with the A antigen as these fractions have been found in the "non-agglutinable" vibrios. It is considered that the use of monospecific sera prepared for the B and C factors may lead to error in the diagnosis of the three types on account of the presence of antibodies against subsidiary fractions unless the complete antigenic formulae of the strain used in manufacture have been ascertained.

In view of the presence of the B and C antigens in non-cholera vibrios it is concluded that these are non-specific. No importance is attributed to the D to M antigen from the point of view of diagnosis although these may be of interest in relation to the geographical distribution of strains.

The selection of strains for cholera vaccine is discussed in the light of the findings. It is suggested that stock vaccine should contain all 19 antigenic fractions and that the vaccine should be modified during the course of an epidemic in accordance with the predominance of the several factors found in the strains isolated. In the absence of detailed information on the antigenic structure the alternative empirical measure might be the inclusion of a number of strains in the vaccine. At the Pasteur Institute of Paris six strains possessing between them most of the fractions are used for manufacture.

In his examination of the Egyptian epidemic strains the author found the predominant antigens to be A, C, D, E and L and he considers that the optimum vaccine under the circumstances would have been one that contained these 5 factors. As no Ogawa strains were isolated the point is raised whether the use of a vaccine containing equal proportion of Ogawa and Inaba strain may not have entailed the risk of the production of inappropriate antibodies and an insufficient level of those which would be useful.

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SYMINGTON S. Dysentery in South Persia. *Brit. Med. J.* 1919 Apr 16 602-3.

This survey concerns a permanent and static civilian population and therefore has a certain value greater than surveys of the same diseases under war conditions. The statistics are based upon the initial laboratory examination of stool from all cases regarded as dysentery in the Anglo-Iranian oil company's 20,000 male artisan employees on Abadan Island.

The rarity of amoebiasis is specially commented upon. Proved amoebic dysentery accounted for only 1.8 per cent, whereas proved bacillary infections accounted for 37.3 per cent, and a further 36.4 per cent. were of bacillary type but unproved. Diagnostic findings are classified below—

coli is being maintained in the presence of a bacterial contaminant *Trichomonas vaginalis* and *T. hominis* grow with great ease and can be isolated from old specimens with no visible organisms. *Balantidium coli* also grows easily, but streptomycin inhibits the establishment of the initial cultures. Attempts to cultivate *Endolimax nana* and *Giardia intestinalis* were unsuccessful.

P C C Garnham

MILLER, M J & FIRLOTTE, W R. Studies on Amoebiasis in Canada. Part II. A Method for obtaining Viable Cysts of *Entamoeba histolytica* free from Bacteria. *Canadian J Res Sect E Med Sci* 1948, Dec, v 26, No 6, 299-302, 3 figs (2 on pl)

Inoculation of a modified Boeck & Drbohlav medium with sterile cysts of *Entamoeba histolytica* was performed in the following manner. Infected stools were obtained from inhabitants of a boys' orphanage. Cysts were concentrated by a zinc sulphate flotation method and were washed and suspended in sterile Ringer's solution to which penicillin (500 units per cc) and streptomycin (1000 units per cc) had been added. A resistant streptococcus was eventually eliminated by picking up the cysts with a micro-pipette and resuspending them in Ringer's solution plus antibiotics, the process being repeated five times. Details of a modified micro-pipette apparatus are given. The entire procedure takes about 8 hours to complete.

The method was devised in order to test the growth requirements of the amoebae. Various strains of bacteria were added to the culture tubes in order to discover those which best sustain growth. It is stated that the details of these experiments will be communicated later [for Part I of this series, see this *Bulletin*, 1948, v 45, 1083].

P C C Garnham

LYON, E. Chronic Hepatitis in connection with Amoebiasis. *Acta Med Orientalia* 1948, Sept-Oct, v 7, Nos 9/10, 175-81 [18 refs]

Four cases of chronic amoebic hepatitis are described. The author considers that two aetiological factors must be taken into consideration—an organotropic factor owing to the affinity existing between the amoebiasis and the liver—and an allergic one which is mainly brought about by constitutional features.

The main symptoms are paroxysmal pain and swelling of the liver. The functional liver damage gradually subsides.

A prompt response to emetine and yatren treatment was not noted. No efforts should be spared to protect the liver tissue—a low fat, but high carbohydrate and protein diet is required. Owing to the patients' lack of appetite, casein hydrolysates had to be used in order to avoid protein exhaustion. In particularly violent attacks of pain, sympathetic anaesthesia (paravertebral block) may be indicated, but antistim orally has been given with good results.

P Manson-Bahr

TURNER, E. A Case of Cerebral Amoebic Abscess treated by Modern Chemotherapy. *J Neurol Neurosurgery & Psychiatry* 1948, Nov, v 11 (ns), No 4, 291-3.

STEIN and KAZAN in 1942 (*J Neuropath Exper Neurol* 1942, v 1, 32) described the sixtieth case of cerebral amoebic abscess in the literature—in only fifteen of the sixty were amoebae actually seen in the contents of the abscesses.

It is a matter for speculation whether cerebral amoebic abscess may not be curable with modern chemotherapy.

AMASTOPOULOS B. A Preliminary Note on Routine Culture Methods for *Endamoeba histolytica*. *Puerto Rico J. Pub. Health & T. of Med.* 1947 Mar v 24 No 3 240-4. [Spanish version 243-5]

In Porto Rico the author cultured 100 faecal samples } to 24 hours old, for *Endamoeba histolytica*. The Boeck Drbochlay medium was used [this *Bulletin* 1925 v 22 727] with Locke solution inactivated human serum and rice powder. omission of the serum did not appear to affect the results.

Subculture was made every 48 hours on 2 to 4 occasions each (in one case subculture was continued for 5 months).

All but one of the specimens which were positive microscopically for *E. histolytica* were positive in culture. 10 which were negative microscopically were positive in culture. Excystation usually occurred in the first culture though in a few cases amoebae grew only after the first or second transplant.

A table shows the percentage positive findings of intestinal protozoa in the stool, by direct and by culture examination. In the case of *E. histolytica* 7 per cent. were positive microscopically and 18 per cent. on cultivation.

Another table shows the incidence of protozoa among various groups of Porto Ricans based on single stool examinations as found by different workers [see this *Bulletin* 1928 v 25 244 1934 v 31 281 1935 v 32 344 1946 v 43 1143]. The present author's finding of 17 per cent. in the 100 samples studied "indicates a slightly higher incidence of the parasite than has been reported to date from Puerto Rico." [But this does not take account of LOTIC and FELSENFELD's finding of 17.33 per cent. of *E. histolytica* among patients in Porto Rico by means of direct smear and flotation. see this *Bulletin* 1948 v 45 1005.]

The author considers that this cultural method may be used for routine diagnosis of intestinal protozoa especially where undifferentiated pre-cystic stages or a few doubtful cysts are found by other methods.

H. J. O'D. Burke-Gaffney

SHAFFER J. G. RYDEN F. W. & FRYE W. W. Studies on the Growth Requirements of *Endamoeba histolytica*. IV. Further Observations on the Cultivation of *E. histolytica* and other Intestinal Protozoa in a Clear Medium without Demonstrable Bacterial Multiplication. Some Modifications and Simplifications of the Medium. *Amer. J. Hyg.* 1949 Mar v 49 No 2, 127-33.

The medium previously described by these authors this *Bulletin* 1948, v 45 786 787 1001 has been simplified by the omission of the filtrate of the bacterial complex and now consists of the following —

- 2 cc. normal saline
- 0.5 cc. normal horse serum
- 500 Oxford units of penicillin G sodium,
- 2.5 cc. pre-conditioned thioglycollate medium.

The last ingredient is the supernatant fluid from a centrifuged 24 hour culture of the special streptobacillus. It contains trypticase dextrose salt methylene blue agar sodium thioglycollate and between 10 000 and 100 000 streptobacilli per cc. It is highly labile and must be used within a few minutes of preparation. Anaerobic conditions are essential for successful cultures. The first inoculation must be into media containing larger quantities of antibiotics (1 000 Oxford units of penicillin and 1 500 units of streptomycin per cc.) The technique is unsuitable for routine diagnostic procedures but its employment will help in determining the food requirements of intestinal protozoa.

Six strains of *E. histolytica* have been isolated and maintained in the new medium, including one strain derived from cyst alone. A culture of *Entamoeba*

of cases The clinical course of the disease in cats with pure bacterial infections and those which were also infected with amoebae ran a parallel course The majority of animals died after a week and a few after two days They wasted away with fever and passed diarrhoeal blood-stained stools

Histopathological studies revealed extensive mucosal necrosis in the bacterial infections, with oedema and hyperaemia of the submucosa The bowel lumen was filled with detritus and mucus and the inflammatory process extended into the small bowel In some cases the lungs, liver and spleen were affected

In the majority in which combined infection with amoebae had been established the cellular picture was identical, save that in the most extensive necrotic areas amoebae could be demonstrated It is not suggested that these cases in which the amoebae lived in the necrotic detritus could be regarded as genuine cases of amoebic dysentery In genuine intestinal amoebiasis the amoebae burrow into functionally healthy tissues in contrast to the former condition where these organisms are merely existing in the form of exaggerated intestinal parasitism [as opposed to tissue parasitism] Quite exceptionally the combined amoebic infection loses its secondary character In their normal course the amoebae by fermentative cytotoxicity invade the muscularis mucosae The less pronounced the bacterial infection the more typical the amoebic lesions become It was established that synergic infection was primarily brought about by haemolytic streptococci and that they were responsible for the bacterial spoiling, but later they were superseded by a pathogenic variety of *Bact coli* An associated trichomonas infection appeared to play no part The bearing of these observations on the clinical picture in man should be critically assessed

P Manson-Bahr

COUTELEN, F, BIGUET, J & COCHET, G Déterminisme de la phagocytose expérimentale de divers amidons par *Entamoeba invadens* [Experimental Study of Phagocytosis of Different Starches by *Entamoeba invadens*] *Bull Soc Path Exot* 1948, v 41, Nos 11/12, 652-6 [15 refs]

Cultures of *Entamoeba histolytica* are known to be most prolific when the medium contains rice starch, other forms of starch are much less suitable The phagocytosis of different starches by the reptilian amoeba, *E invadens*, was compared, and rice, arum, oats, maize, arrowroot, barley, pea, wheat, rye and potato were studied The size of the granules of these starches was measured Unlike the human amoeba, the snake amoeba actively ingested all the materials, even the potato starch which was present in grains about 30-60 μ in diameter These were the largest of all those tested and were least utilizable It was remarkable that granules 32 μ in diameter could be ingested by organisms measuring themselves only 36 μ Nevertheless, a preference was shown for the smaller types e.g. rice starch at 4-6 μ , this also was found to possess the additional advantages of being regular in form and not liable to agglomeration Arum starch also shows these properties and is equally effective in cultures of the organism

The starch is stored as glycogen in the endoplasm of the amoeba, where its presence can easily be demonstrated by the use of Lugol's iodine solution

P C C Garnham

See also p 641, ROBERTS, A Protozoological and Helminthological Survey of Three Races in Nairobi, Kenya

In this paper the evidence in favour of the amoebic origin of the multiple cerebral abscesses is open to criticism. The patient a soldier had served only nine weeks in India before his admission to a military hospital. He presented the classical signs of cerebral abscess in the temporal lobe. In the pus abstracted through a burr hole by left temporal incision chains of streptococci were seen in a direct smear. Later the brain was tapped again and a second intracerebral abscess was entered behind the first. The pus was at first thin and watery and on direct examination numerous vegetative amoebae actively mobile were seen in a slide. Cultures later produced non haemolytic penicillin resistant streptococcus. At necropsy the brain showed widespread meningo-encephalitis with the left hemisphere riddled with abscesses. In sections groups of streptococci were seen but no amoebae.

The patient was treated with sulphonamides, penicillin, streptomycin and emetine but the last-named was only begun 3 months after the illness started. The illness lasted for 4½ months and ended fatally. *P. Manson-Faulk*

ZUIDERMA, P. J. Over emetine-intoxicatie. [Emetine Intoxication.] *Ned Vaezkdlaal*, Batavia, 1949 Feb. 1 v 2, No 2, 33-7 1 chart.

The English summary appended to the paper is as follows —

In an Indonesian patient, 6½ years old, severe myocardial damage occurred after 9 subcutaneous injections of 60 mg emetine each corresponding with 7 mg emetine per h.G. body weight. The pulse rate suddenly rose to 128. The electrocardiogram revealed a lowered ST segment in Lead 1 and 2, a negative T in Lead 2 and 3 and a flat T in Lead 1. No other signs of intoxication were noted.

Notwithstanding absolute rest in bed it took 3 weeks for the pulse rate to drop gradually to its original height. Another electrocardiogram, taken 4 weeks after the first, showed that the abnormalities had disappeared for a great deal.

"Probably in this patient a high individual susceptibility existed for the drug. This is also suggested by the history of the patient since in 1918 after 7 injections of emetine (dosage not known) a complete paralysis of the extremities occurred, for which a stay of several weeks in hospital became necessary."

At the present time cardiac damage was the only clinical evidence of intoxication. It is suspected that organic heart disease existed already before emetine treatment was initiated."

WESTPHAL, A & MARSHALL F. Amöbenruhr bei Katzen auf bakterieneller Grundlage. [Amoebic Dysentery in Cats in relation to Associated Bacterial Infection.] Reprinted from *I volker Arch f Path Anal u Physiol* 1941 v 308 No 1 22-44 9 figs.

The connexion between the establishment of amoebic dysentery and previous bacterial injury has been established by WESTPHAL in man (ibid. *Bulletin* 1950 v 36 [288]) and DESCHENS (ibid. 31) and others in cat and the work suggests a combined action. The present work has been planned on a different basis in that the bacteria used had been associated with a strain of *F. histolytica* which had been rendered virulent for cat. By comparison of infection with bacteria alone with those caused by the combined amoebic action it was hoped to decide by means of rectal injections, what particular rôle the amoebae played. From experiments conducted on three lines it was decided that the symbiotic bacteria alone sufficed to bring about fatal dysentery in the majority

once exceeded that of Fijians and the totals during that period have been 63 Fijian and 58 Indians, despite the great preponderance of the latter patients

The epidemiological importance of these findings is discussed as the Indians live more independent and less supervised lives, it is much more likely that undetected cases would occur among them

Of the 52 admissions from the Gilbert Islands, 23 were fairly advanced and 16 were very advanced lepromatous cases over 80 per cent were infective War conditions and enemy occupation would have caused deterioration in the position The finding of 7 moderately advanced cases out of 9 Samoan admissions is more disturbing, and the author indicates the urgent need for special training of medical assistants in these islands who would be allocated to a travelling diagnostic survey, as has been done successfully in the Cook Islands where admissions are now among the earliest cases in Makogai

Tables show in detail the distribution of cases in terms of nationality, types of disease and progress, the incomparably better outlook in early neural cases being obvious

The Medical Superintendent took with him on visits to Samoa, Tonga and Niue Island a 16 mm film dealing with Makogai and it was evident that this was greatly appreciated

There were 8 deaths from tuberculosis, five of the patients being diagnosed during the year The importance of this rapid development of the disease in those under fairly close medical supervision is stressed

At the end of the year, 13 cases of tuberculosis remained these had been confirmed by the tuberculin test, X-ray and sputum examination Four of the patients were Gilbert Islanders, two each Indians and Fijians, and one each from other islands Routine tuberculin tests and X-ray examinations are being made as far as possible, despite shortage of films and drugs In 1947, a total of 266 X-ray examinations were made 79 of these were of bony lesions

An imposing list of items of food and other materials produced at Makogai in the year includes 840,000 lb of vegetables, 99,858 lb of bread and 39,126 lb of beef There were also 5,657 gallons of milk and 4,457 eggs An interesting item is the production of over 9,000 lb of soap

The only major constructive work possible during the year was the erection of a new school building for the boys

[This is an instructive account of an admirable institution it is regrettable that post war difficulties should make delay in improvements and extensions inevitable]

H J O'D Burke-Gaffney

DE SOUZA CAMPOS, Nelson & BECHELLI, Luiz Marino Sintomatologia nervosa da lepra

This book is reviewed on p 681

REYES, E, BARRIENTOS, E, RODRIGUEZ, J J, CARRANZA AMAYA, A & PERALTA, R Severe Reaction resembling Therapeutic Shock in Lepers following Administration of "Diasone" *Arch Dermat & Syph* 1949, Jan, v 59, No 1, 118-19

Two patients in San Salvador, aged 39 and 12 years, were treated for lepromatous leprosy confirmed bacteriologically After some months of treatment in 1946 with chaulmoogra oil, later replaced by promin, the nodular eruptions disappeared almost entirely

In May 1947, diasone was introduced as a routine treatment in the authors' department and each patient was given 'a daily dose of 0.3 gm given three times a day by mouth' After 8 weeks of such treatment, the two patients in

LEPROSY

MAURANO Flavio & others. *Tratado de Leprologia*. Vols. 1-3.

This book is reviewed on p. 678

INYES J R. Leprosy in Kenya. *East African Med J* 1949 Feb v 28 No 2, 32-5

This study, carried out in the second half of 1948 followed the lines of the author's leprosy survey in Uganda [this *Bulletin* 1949 v 46, 287]. Detailed statistics are shown in two tables. In all, 53,814 persons were examined in seven main areas including the coast inland and highlands. The incidence of leprosy averaged 10.2 per thousand, the highest being the Vvanja area (31.7) and the lowest the Taita Vot-Sagala area (0.9). The estimated number of cases in Kenya put at 35,000. The Juhos tribe were the most heavily affected and the Wateta, Kipsigis and Nandi the least. The author suggests that the course of spread is probably from West to East and not from the coast. The type of leprosy in Kenya is described as "something in between moderate and severe" about 20 per cent of cases are of the infectious lepromatous type and because of living conditions of the people a low increase of the disease appears to be inevitable at present. The general observations are largely similar to those in the case of Uganda: overcrowding and high humidity especially the first are influential factors in stimulating a high incidence of the disease. Movements of the people and especially absorption of members of highly affected tribes into employment may enhance the spread.

Facilities for treatment and control are inadequate: only 60 to 60 cases are under effective modern treatment and some 200 others are in two leprosy camps. There is obvious scope for an active campaign with modern facilities and propaganda.

H. J. O'D. Hurst-Gaffey

AUSTIN C J. Central Leprosy Hospital, Makogai (Annual Report 1947). *Fiji Legislative Council Council Paper No 40* 1948 Appendix B 34-40 1 diagram.

Dr Austin's report on the Central Leprosy Hospital Makogai gives an informative account of the position during 1947 supported by 8 useful statistical tables and a diagram.

At the end of 1947 there were 703 patients in the hospital, an increase of 90 during the year of these only 19 were from Fiji itself and the remaining 73 came from neighbouring island principally the Gilbert Islands which contributed 45 patients to this increase.

New admissions amounted to 146 of which 64 were from Fiji and 82 from other South Pacific territories. It is noteworthy that 46 of the 146 admissions were Indians and only 14 were Fijians. Furthermore the number of Indian patients increased by 27 during the year and the Fijians decreased by 5. The ratio of Indian to Fijian men treated at Makogai is indeed steadily increasing and is now well over 2:1 and 19 of the 46 Indian admissions are in fairly advanced and infective lepromatous stages compared with only 3 of the 14 Fijian admissions.

In fact some 70 per cent of the Indian patients are in the lepromatous stage which contrasts with findings in India where the neural type largely preponderates. This situation in Makogai is further reflected in the fact that of 23 deaths 9 occurred in Indians and that of 30 discharges only 10 were Indians. During the past 4 years the annual discharge of Indians has only

once exceeded that of Fijians and the totals during that period have been 63 Fijian and 58 Indians, despite the great preponderance of the latter patients

The epidemiological importance of these findings is discussed as the Indians live more independent and less supervised lives, it is much more likely that undetected cases would occur among them

Of the 52 admissions from the Gilbert Islands, 23 were fairly advanced and 16 were very advanced lepromatous cases over 80 per cent were infective War conditions and enemy occupation would have caused deterioration in the position The finding of 7 moderately advanced cases out of 9 Samoan admissions is more disturbing, and the author indicates the urgent need for special training of medical assistants in these islands who would be allocated to a travelling diagnostic survey, as has been done successfully in the Cook Islands where admissions are now among the earliest cases in Makogai

Tables show in detail the distribution of cases in terms of nationality, types of disease and progress, the incomparably better outlook in early neural cases being obvious

The Medical Superintendent took with him on visits to Samoa, Tonga and Niue Island a 16 mm film dealing with Makogai and it was evident that this was greatly appreciated

There were 8 deaths from tuberculosis, five of the patients being diagnosed during the year The importance of this rapid development of the disease in those under fairly close medical supervision is stressed

At the end of the year, 13 cases of tuberculosis remained these had been confirmed by the tuberculin test, X-ray and sputum examination Four of the patients were Gilbert Islanders, two each Indians and Fijians, and one each from other islands Routine tuberculin tests and X-ray examinations are being made as far as possible, despite shortage of films and drugs In 1947, a total of 266 X-ray examinations were made 79 of these were of bony lesions

An imposing list of items of food and other materials produced at Makogai in the year includes 840,000 lb of vegetables, 99,858 lb of bread and 39,126 lb of beef There were also 5,657 gallons of milk and 4,457 eggs An interesting item is the production of over 9,000 lb of soap

The only major constructive work possible during the year was the erection of a new school building for the boys

[This is an instructive account of an admirable institution it is regrettable that post war difficulties should make delay in improvements and extensions inevitable]

H J O'D Burke-Gaffney

DE SOUZA CAMPOS, Nelson & BECHELLI, Luiz Marino *Sintomatologia nervosa da lepra*

This book is reviewed on p 681

REYES, E, BARRIENTOS, E, RODRIGUEZ, J J, CARRANZA AMAYA, A & PERALTA, R Severe Reaction resembling Therapeutic Shock in Lepers following Administration of "Diasone" *Arch Dermat & Syph* 1949, Jan, v 59, No 1, 118-19

Two patients in San Salvador, aged 39 and 12 years, were treated for lepromatous leprosy, confirmed bacteriologically After some months of treatment in 1946 with chaulmoogra oil, later replaced by promin, the nodular eruptions disappeared almost entirely

In May 1947, diasone was introduced as a routine treatment in the authors' department and each patient was given "a daily dose of 0.3 gm given three times a day by mouth" After 8 weeks of such treatment, the two patients in

question complained that their former eruptions were again breaking out. Examination showed that nodules were spread over exactly the same area which they had originally covered. This phase was accompanied by migraine, epiphora, nausea and fever. Dione therapy was suspended and the phenomena disappeared gradually within 3 days. At the time of the appearance of the reaction, the patients had received 15 g. and 10 g. of dione respectively.

It is added that two weeks later dione was given again to the first patient and the eruption reappeared within 4 days with greater intensity and took a longer time to disappear. Hence in such cases dione should be completely discontinued. The authors note that although such reactions as vomiting, diarrhoea and allergic dermatitis have been recorded with the use of dione the present reaction appears not to have been described. They liken it to the Herxheimer reaction.

H. J. O'D. Burk Gaffey

CAPURRO E. T & GUILLOT C. F. Vitaminoterapia D₂ a alta dosis en el tratamiento de la reacción leprosa tuberculoide. [Treatment of the Leprous Reaction in Tuberculoide Leprosy with Vitamin D₂ in large Doses.] *Rev. Argentina Dermatología* 1946 July-Dec. v. 12, No. 34 287-91

Charpy has used pure vitamin D (Sterogyl 15) in alcoholic solution for leprosy patients in doses of 15 mgm., three during the first week, two weekly for the next three weeks and thereafter once a week till a year. Treatment had been completed. The results were reported as striking (*brusques*) the inflammation, oedema and erythema disappeared in a few days and the nodules though more resistant, became smaller and in time they also disappeared. Charpy explained its action thus: "Vitamin D₂ in large doses properly paired with a diet not too acid and not too alkaline and with a proper amount of calcium creates in the tissues a state of permanent acidity. Apparently this state induces leprosy sterilization and cur of tuberculous lesions. Mycobacterium and Mycobacteria being closely allied the authors decided to try the same treatment in the acute reactional states of tuberculoide leprosy."

Five patients started the treatment in September 1946. In four the lesion began to improve within 7-10 days and they were cured (in the authors' word there was 100 per cent. improvement) in 45 days and the vitamin treatment was stopped in January 1947 that is after 4 months. One gave up the treatment because of intercurrent cardiac trouble.

Later a fresh group of 10 patients came under observation. Eight kept up the treatment which was modified somewhat from the original 600,000 unit were given three weekly for 3 weeks. Detail of one patient: a woman 43 years of age, with the remark that the others responded similarly. This patient had already been treated with chaulmoogra, the oil and the ethyl esters and with promin and other drugs. Improvement began after 7 days and continued without setback. The nasal obstruction cleared in 3-4 weeks. The maculae lost their colour and desquamation was copious. There appears to be some confusion about the dosage in unit. In one place it is stated that the patient took three ampoules in the week (total 180,000 unit). If the dose was an ampoule of 600,000 unit this total should be 1,800,000. Later it is said, another three ampoules were taken or altogether 6 ampoules of 300,000 unit (1,800,000). Three more in the third week that is a total of nine ampoules or 5,400,000 which is correct. Altogether in the first month there were given eleven ampoules of 600,000 unit (should be 6,600,000). During the second month one ampoule a week. Total six ampoules or 3,600,000 unit (this should be 2,400,000 unit).

H. Harold Scott

ANN INTERN MED 1949, Mar \ 30, No 3, 692-700 [27 refs] New Developments
in the Management of Leprosy

A useful review

DE SOUZA CAMPOS Nelson & BECHELLI, Luiz Marino Organização e Funciona-
mento de Preventórios

This book is reviewed on p 682

HELMINTHIASIS

ROBERTS, J I A Protozoological and Helminthological Survey of Three Races
in Nairobi, Kenya *J Trop Med & Hyg* 1949, Mar, v 52, No 3, 49-59,
2 charts

This is a record of seven years' routine examinations of stools of people living in Nairobi, Kenya. The specimens came from in- and out-patients (European, Asian and African) and were examined direct and after centrifugation, in saline and iodine-stained preparations. 33,166 European specimens, 40,503 African and 5,409 Asian were examined. More than half of the European and three-quarters of the African specimens showed the presence of parasites. Helminthic infections were light and the cases were regarded more as carriers than as victims. There were few symptoms and little or no anaemia. Nevertheless, the author suggests that the mild toxæmia arising from the infections is of major importance in causing an almost life-long damage to the power of development, leading to general mental and physical apathy. The backwardness of tropical populations is said to be associated with this toxic absorption [Unfortunately no proof of toxæmia or of its direct relation to these conditions of apathy is presented. The fact that the mental and physical powers of newly-recruited African technicians improve after anthelmintic treatment, may easily be ascribed to changes in environment, better food, etc.]

Schistosomiasis is ranked high as a cause of ill-health (1.6 per cent of all specimens contained ova), *S. mansoni* infections are found from the coast to 8,000 feet above sea-level. No collections of water in inhabited areas of Kenya can be regarded as free from the possibility of infection. The chief molluscan host is *Biomphalaria pfeifferi*, another is *Bulinus tropicus*. Other important helminths were *Taenia saginata* (9.0 per cent), *Ascaris* (4.3 per cent), and *Necator americanus* (5.3 per cent).

Entamoeba histolytica is essentially found in town-dwellers, it is rare in rural areas. The incidence of the infection is highest in the hot dry season. It is more commonly associated with mild symptoms of abdominal discomfort than with dysentery. In the latter case, the vegetative forms are said to be always larger than in the former. For a year, cases were classified according to the presence or absence of ingested red blood cells in the amoebae—there were only two cases with ingested cells and 80 without. *Giardia intestinalis* was the cause of a chronic mucous diarrhoea in both adults and children. Six cases of balantidial dysentery were encountered. A survey of 86 intestines from pigs slaughtered in the Nairobi abattoir showed that 32 per cent were infected with *Balantidium*. In the main table, 79 cases of *Isospora hominis* are recorded, without comment. [In view of the comparative rarity of this infection, as indicated in the literature, it would have been an advantage if some amplification of this interesting finding had been given in the text.]

P C C Garnham

OSORIO M. Teresa. Sobre una modificación a la técnica de cuenta de heces de Stoll. [A Modification of Stoll's Method for counting Helminthic Ova. *Rev Inst Salubridad y Epidemiol T op Mexico*. 1948 Sept 10 No 7 245-52.]

For his experiments the author used puppies 2-6 months old and infected them with 1 *Cylostoma can num*. His modification of the Stoll method is slight but he claims that it is quicker easier in not needing any special chemicals can be carried out by any practitioner and is practically as accurate. He places 1 gm. of faecal matter in an Erlenmeyer flask, adds water to the 30 cc mark and 10 glass bead inserts a rubber stopper and shakes well to obtain a homogeneous suspension. He extracts 0.1 cc. with a capillary pipette places it on a slide with a coverglass 20x40 mm. and counts all the eggs in the preparation. He repeats this with a second sample and multiplies the total result by 100 to obtain the number of ova in 1 gm. of faeces. The difference from the classical Stoll method consists in adding water instead of decinormal soda and diluting 10 instead of 15. He made 41 counting by the methods of Stoll Lane Caldwell and this modified Stoll and shows in tables that the results obtained by his modification are really comparable with and closely similar to those with the original Stoll and on the whole better than with the Lane or Caldwell methods.

H. Harold Scott

BOYILLA NAIR, A & GÓMEZ VARGAS M. "Aer y faust, faust simplificado. Dos nuevos métodos para investigar parásitos intestinales. [The AEX Method and Faust's Method (Simplified) for detecting Intestinal Parasites.] *Repertori Med y Cirugía*. Bogotá. 1948 v 4 No 1 49-68 48 refs.]

These two procedures are detailed and the authors then compare the results obtained by these and the standard method of Will-Mallory and the Stoll techniques and direct examination.

By the AEX method of Loughton & Stoll, 50 cc. of tap water are placed in a Stoll flask and 4 cc. of faeces emulsion in water added. The whole is vigorously shaken with glass beads to obtain a homogeneous product. 1.5 cc. of this placed in a 15 cc. centrifuge tube and to this are added 3.5 cc. of 20 per cent HCl after stopping with a rubber plug the mixture is shaken for one minute then put aside for two minutes. Next 3 cc. of a mixture of ether and xylol in equal part are added and the whole is again shaken for one minute and centrifuged at 1,000-2,000 r.p.m. for two minutes. The material collected on the walls of the tube is carefully removed by a thin piece of wood, the supernatant is poured off and one drop of decinormal NaOH added to the deposit some of this deposit is removed with a capillary pipette and examined.

The original Faust method, say the authors is inconvenient in needing several manipulations and is time-wasting. The first-named author Dr B. M. Naair has modified it thus. He mixes about 1 gm. of faeces in 10-12 cc. of zinc sulphate solution sp. gr. 1.100 in 15 cc. centrifuge tube and centrifuges for 5 minutes at 1,500-2,000 r.p.m. With a capillary pipette or a loop material is taken from the surface placed on a slide and examined.

The authors give the results of 100 samples examined at their laboratory by each of the 2 methods and conclude:

1. The AEX method was the best for finding ova of hookworm, *Trichuris* unfertilized faecis and larvae of *Strongyloides stercoralis*. By it also cysts are found but mostly unchanged to prevent difficulties in identification.

2. The Simplest Faust method is better service for helminthic ova but is the method of choice for protozoal cysts.

3 The *Willis-Mallory method* was good for concentrating helminth ova, but not so good as AEX because unfertilized *Ascaris* does not show up and neither larvae nor cysts were found by it

4 *Stoll's original method* was useful for helminth ova and larvae, but less so than AEX or the Willis-Mallory

5 *Direct method* was the only one to show trophozoites of *E. histolytica* in acute amoebiasis and in only 50-70 per cent were helminthic ova found, in 43 per cent *E. histolytica* and in 83 per cent *Giardia intestinalis* were found

"In none of our preparations did we meet with ova of *Enterobius vermicularis* which confirms the rarity of this in the faeces [here] and the need for using Hall's Cellophane method or some modification of it"

H Harold Scott

NEVES, A de O A esquistosomose no Estado do Espírito Santo
[Schistosomiasis in the State of Espírito Santo] *Anais Depart Estadual Saude Espírito Santo* 1948, 37-102, 5 maps & 1 chart

After remarks upon the geographical situation, the climate, the hydrographic and other general details of this State of Brazil, the author gives the results of examinations carried out in 18 localities of Espírito Santo. In the majority of them only 100 or so examinations were made and in some much less, so that detailed figures will have little interest. Summing up the examinations of 56,206 faecal specimens in the course of 10 years, 1935-1944, 800 were positive (1.4 per cent). This, however, is regarded as misleading if applied too strictly, for in another set of examinations, among 6,159 there were 759 positive, or 12.3 per cent and at Guandu and Santa Joana, the most severely infested zone, an even higher degree was found, 643 among 2,893 (22.2 per cent). The vector is *Australorbis centumetralis*

H Harold Scott

ERFAN, M, ERFAN, H, MOUSA, A M & DEEB, A A Chronic Pulmonary Schistosomiasis a Clinical and Radiological Study *Trans Roy Soc Trop Med & Hyg* 1949, Mar, 42, No 5, 477-85, 6 figs on 4 pls [10 refs]

From 103 parasitically diagnosed cases of urinary and intestinal schistosomiasis at the Fouad I Hospital in Cairo 49 cases of pulmonary schistosomiasis were selected for study. The diagnosis rested on the fact that the patients had a proven gut or bladder infestation, and radiological changes in the lungs which improved after antimony treatment. Forty-four of the patients were males and the rest females, this sex-disproportion is in part due to the reluctance of women to enter hospital, the ages of the patients ranged from 10 years to 55 years (children below 10 are not admitted to this hospital).

The onset of symptoms was insidious, those commonly encountered were dyspnoea on exertion, cough (and in one case slight haemoptysis), general weakness, giddiness and fainting, palpitation, and thoracic and praecordial pain.

In 34 of the 49 patients no physical signs were found in the lungs, in 15 there were some moist sounds at the bases, sputum was examined from only 7 of the patients, and in no case were schistosome ova found in it. The physical signs included slight cyanosis (3 cases), clubbing of the fingers (7 cases), and swelling of the superficial cervical veins with congestive heart failure (2 cases). In 28 of the 49 patients there were signs of pulmonary hypertension and dilatation, in most there was accentuation or splitting of the second heart sound and a harsh systolic murmur in the pulmonary area. Forty-one patients had enlargement of the liver, and 38 enlargement of the spleen, 10 had ascites, and 5 oedema of the legs. No patient had a pyrexia due to the schistosomal

pulmonary involvement the haemoglobin values ranged from 15 per cent. to 104 per cent. but in 6 cases the low figure was ascribed to ankytostomiasis the eosinophil counts ranged from 1 to 40 per cent.

Antimony treatment [the drug used is not specified] of 44 of the patients resulted in improvement in some cases, but it caused fever, urticaria, acute pulmonary congestion and a marked eosinophilia in others one of whom died as a result. The pulmonary reaction to specific treatment may be due to allergy or to focal reactions around the lung lesions. Bronchial asthma and a focal pneumonia possibly verminous are their clinical manifestation.

Erfan and Deeb in an appendix classify the pulmonary lesions into three radiological grades. Grade I in which there are focal arterial changes. Grade II in which there are widespread arterial changes with slight heart changes and Grade III in which there are widespread arterial changes with gross heart changes. They detail the lesions they encountered and give illustrative radiographs.

J. A. D. Adam

GELFAND M. Schistosomiasis of the Female Genital Tract. *South African Med J.* 1949 Apr 2, v. 23 No. 14 233-7

The author reviews the literature of schistosomiasis of the female genital tract and refers to the difficulties in interpreting correctly symptoms attributable to infections of that tract. Many parts of the genito-urinary tract may be affected by schistosomiasis concurrently and, particularly in Africans, the prevalence of coincident gonorrhoea or other infections may complicate the issue.

Existing literature does not appear to define clearly how frequently the different parts of the genital tract may be affected. The present study made in Southern Rhodesia, was directed towards determining this point and also the relative frequency with which *S. haematobium* and *S. mansoni* respectively settled in these parts.

Thirty African women between 20 and 35 years were studied consecutively at autopsy. Evidence of schistosomiasis was found in each case in either the urinary or intestinal tract. The various organs or parts were dissected and separated carefully and placed in appropriately labelled containers. Each was digested separately for 1½ hours at 60°C. in 10 per cent. caustic potash solution and the digested portions were examined microscopically for ova.

The results are given for the bladder, rectum, vagina, cervix, uterus, arms and Fallopian tubes. The bladder and rectum contained ova in every case. In one case the bladder contained ova of *S. mansoni* in addition to *S. haematobium*. In ten cases the rectum contained ova of both species, in 18 there were only *haematobium* ova and in 2, *mansoni* ova alone.

The distribution of ova in the genital tract of the 30 cases was as follows:—

Number of cases	Number containing only a few ova
Vagina—23	7
Cervix—28	11
Uterus—23	not stated
Ovaries—1	10
Fallopian tubes—16	4

It will be noted that in the majority of positive cases, ova were present in fair quantities, the minority reporting "a few or only."

In every case *S. haematobium* was found in only one of the 12 having *S. mansoni* in the rectum were ova of this species found in the genital tract, this was in the vagina where *mansoni* ova were found in addition to *haematobium* in a single case. The author draws attention to this frequency of ova in the genital tract in *haematobium* infections and their rarity in *mansoni* infections. "It may be assumed that if a patient has urinary bilharziasis, the probability is that she will have ova of *S. haematobium* in some portion of the genital tract." In no case in this series was a genital tract free from ova and generally more than one part was affected. It is noted that the vagina and cervix were most commonly affected.

The author points out that the exact significance of these findings cannot be assessed but "it seems reasonable to argue that in the majority of cases the damage is minimal and symptoms will not be produced, but where the local deposition is severe, particularly in the Fallopian tubes or ovaries, effects from the fibrosis may ensue, resulting in sequelae, such as sterility or ectopic gestation."

H J O'D Burke-Gaffney

TALAAT, S M & SHOAI B, S The Intensive Treatment of Schistosomiasis with Tartar Emetic J Roy Egyptian Med Ass 1948, Dec, v 31, No 12, 961-3

The authors have continued the work already reported [see this *Bulletin*, 1948, v 45, 719]. They have treated 90 hospital patients having schistosomiasis (17 of them under 15 years of age) with intensive courses of tartar emetic [species of schistosome not stated]. Each adult patient received 2 grains of tartar emetic dissolved in 20 cc of 5 per cent glucose twice daily on two consecutive days. As the first five children did not seem to respond to this course, the remainder were given "three injections instead of two" [later it is stated that "children under 15 years of age must be given an extra injection on the third day to ensure satisfactory results"]. There is some ambiguity in the use of the word "injections" which seems in some of the contexts to mean "daily dosage" the exact amount of tartar emetic given to children is not therefore clearly stated.]

Patients were observed for one month, and in a few cases for two to seven months. At the end of the observation period, 73 patients were rid of their ova, two passed dead ova and 15 passed living ova. One month later 10 of these 15 were given a second course and all (with the exception of one child) became free from ova.

The authors state that their modification of injection technique "did not seem to affect or increase the untoward reactions when individual tolerance was observed."

Since the paper noted above was published the authors have found that renal disease does not contra-indicate this form of therapy, so long as urinary output is good they have also given the course to two patients having a haemoglobin percentage of 25 to 30. There were no complications, but nevertheless the authors consider administration of the drug risky in such cases. A decompensated heart and cyanosis are to be considered contra-indications.

Ten of twelve children under 15 who were given the additional treatment ceased to pass ova.

One of the authors has treated 13 private patients without complications. In these cases, the patient rested for 15 minutes before leaving the clinic and was advised to abstain from manual work for a week.

In the hospital cases, the patients were injected with a S15 or 16 bore needle the patient lay flat during the injection and for 10 minutes afterwards.

H J O'D Burke-Gaffney

SCHUBERT M., GOLDBERG Evelyn & SCHNEIDER, Freda G. Comparison of Several Antimonials in the Treatment of Experimental Schistosomiasis Mansonii in Mice *Amer J Trop Med* 1949 Jan., v 29 No. 1 115-27

The results of screening test with various drugs in mice infected with *Schistosoma mansoni* have already been reported in detail by SCHUBERT [*ibid* Bulletin 1948 v 45 620-621]. Comparable dosage of the different antimonials was taken as that approaching the maximum tolerated. A large-scale attempt has now been made to determine the therapeutic indices of the antimonials used against this infection by direct comparison of the LD₅₀ and CD₅₀ (the dose that cured half the mice). Difficulty was found in assessing accurately the LD₅₀. It was determined on infected mice under the same conditions as those in the treated groups and required consideration of the death rate among infected but untreated controls. The mice were infected by intraperitoneal injection of 150 cercariae and the worms were allowed to mature for a period of 8 weeks. During the following 7 weeks groups of 15 mice were treated daily on 6 successive days with various antimonials by intraperitoneal injection except in the case of butyl antimonyl gallate which was added to the diet. Two weeks later i.e. at the 17th week after infection the mice were autopsied and the number, state and distribution (antimonials cause the worm to migrate from the mesenteric veins to the liver) of the worms were determined. Sodium antimony tartrate and urea stibamine appeared to be without effect but neostibosan and neostam had some effect on the worms at maximal dosage. Their therapeutic indices were below 1. Focadin and trihydroxitol showed activity with indices about 1. Three antimony tri-(thiomercaptides) of the general formula Sb(SR)₃ soluble in peanut oil possessed considerable activity as did butyl antimonyl gallate and their therapeutic indices ranged from 2 to 7. Some interesting experimental data are also given which indicate that there is an increase in death rate of the infected mice with advance of the infection. So far as these results in mice go they indicate that some of the Sb compounds described here are more effective against the infection than those generally used. *J. D. Fulton*

ARIM M. A. & ATYAD N. A Preliminary Report on the Value of Palm-Leaf Traps in the Survey and Treatment of Streams Infested with Snails. *Trop Roy Soc Trop Med. & Hyg* 1948 Nov v 42 No 3 231-48 9 figs. & 1 graph.

The authors describe in detail the experiment they made with palm leaf traps in the control of snail in the streams of Egypt. They wished to know to what extent, and at what level snails are carried by large streams, what proportion will be caught by the traps in the presence or absence of other foodstuff, and what is the distribution of snail in a stream under various conditions of current depth, etc. They have illustrated the paper by attractive line drawings of the palm leaf trap in position.

The traps are made of palm leaves chained together in parallel. Each rung consist of two superimposed palm leaves pointing in opposite directions and about 2 metres in length and the rungs are about 50 cm. apart. Some 10-15 rung chained together form the traps and the lowest are weighted so as to reach the bottom of the stream, or hang down into it. The force of the current bulges the traps sometimes very greatly. Snails seek the palm leaves which present a large surface on which they feed or deposit eggs. For finding snail these traps are better than net or the process of dipping.

The result of several experiment in flowing water showed that most of the Bulinus snails caught were found near the surface of the water or about the middle of the traps and that these snails tended to collect where the water

was fairly shallow and the current moderate. The traps functioned well even in the presence of natural food supplies (weedy vegetation) of the snails. In shallow, slow-flowing canals the snails tended to collect on the slopes of the sides, or on the bottom, but in swifter streams they were usually confined to the slopes, and avoided the more swiftly moving water.

In ponds, palm leaves stuck into the banks and projecting into the water collect snails readily, and if they are renewed each week, will greatly reduce the number of snails within a month. Streams may be treated in the same way, but it is advisable to clear the weeds first, and then to stick the leaves into the banks, below the water surface, about 1 metre apart. In this method they are not chained together as in the traps described above. One man can attend to 3 kilometres of bank, removing and replacing the leaves and collecting the snails from them, every week. This method may be used where closure of the canals, and treatment by copper sulphate, are not possible. Certain streams have been so treated for long periods, with good results. [See also this *Bulletin* 1947, v 44, 97.]
Charles Wilcocks

CAWSTON, F. G. Mechanical Purification of River Water [Correspondence]
Trans Roy Soc Trop Med & Hyg 1949, Mar, v 42, No 5, 507-8

In this note, examples are given to show the reduction of coliform bacteria in water which takes place as a result of pumping to raised tanks, and the author considers that "the chances of contracting schistosomiasis are much reduced when water is pumped through metal piping, especially where it is passed through more than one tank and drawn from the bottom layer rather than the surface which harbours those cercariae which attack man."

Flowing water tends to purify itself by contact with stones and by passing over waterfalls but vegetation and molluscs tend to accumulate below waterfalls and to reinfest the water.
H. J. O'D. Burke-Gaffney

BIAGGI, N. & PIRAZZI, R. The Effect of Chloramine on the Miracidia of *Schistosoma mansoni*. *Puerto Rico J Pub Health & Trop Med* 1949, Mar, v 24, No 3, 246-50 [Spanish version 251-5]

"1 Concentrations of chloramine in water, varying from 0.3 to 0.89 parts per million, had a definite effect on the viability of the miracidia of *S. mansoni*.

"2 Chloramine concentrations of 0.45 parts per million inactivated miracidia in an average time interval of 7.2 to 8 minutes.

"3 Miracidia lost their motility in chloramine concentrations of 0.89 parts per million in the maximal time period of five and a third minutes."

KUO SHAO CHOU, YUI HUAN WEN & CHANG CHIANG E. An Abbreviated Report on Field Survey of Schistosomiasis in Szechwan. *Chinese Med J Chengtu* Edition 1945, Apr, v 63A, No 3, 144-8

In 1943 an autochthonous case of *Schistosoma japonicum* infection was found in Chungchingchow, Szechwan, and in 1944 the authors made a survey of that area, and 4 other places round Chengtu, to find other cases, they give details of the people examined, but they did not find any new cases. They also examined over 1,000 snails (*Katayama*), but with negative results. In the mesenteries of 2 of 30 cattle *S. japonicum* was found, but 6 buffaloes and 1 goat were negative. The cattle were heavily infected with *Ornithobilharzia* species.

S. japonicum infection, therefore, is slight round Chengtu. This may be a reflection of the farming practices, for only in summer is the land submerged

for the cultivation of rice and the molluscan host therefore have only half the year to propagate themselves and to receive and transmit infection.

Charles H. Brooks

BEST, A. E., & WE, D. C. Schistosomiasis on the Chengtu Plain, China. *Med J Chengtu* Edition. 1945 Apr., 1: 631 No 3 139-42.

Until 1939 schistosomiasis had not been reported from the Szechuan province of China thereafter hatching tests were done on stools of suspected cases and in five years 15 cases were collected. In one case the miracidium was found only after the 10th hatching test and it is suggested that the disease is probably not as uncommon in the province as had been supposed.

The ages of the patients were from 1 to 40 years and all but one were males either farmers or country school children. The disease was found along the tributaries of the Yangtze around Chengtu.

The clinical features are listed the prominent manifestations were splenomegaly anaemia, enlarged liver fever and leucopenia, with eosinophilia. Urticaria was present in only two cases. Other tables show the measurements of spleen and liver and the laboratory findings. It is noted that in the acute stage leucocytosis was commonly present.

The patients were treated with injections of antimony potassium tartrate varying in dosage according to the patient size and reaction a sudden drop in the leucocyte count was taken as an indication for immediate suspension of the antimony injections.

The author believe that many of those affected contracted the disease early and that the intestinal manifestations had passed unnoticed.

H. J. O'D. De la-Goffary

HOEIXGSTRIJ, R. P. Observations on the Epidemiology of Infections with *Clonorchis sinensis*. *Trois Rev Soc Trop Med & Hyg* 1949 Mar 14, 4, 5 500-6, 1 fig.

Acute clonorchiasis is rarely seen, possibly because Chinese (Cantonese) and Japanese contribute the great majority of cases and having harboured the infection for centuries they have perhaps developed some degree at least of racial immunity. Hence this account of an acute outbreak on a large scale among nearly 20,000 persons of European origin gathered together in Shanghai under poor hygienic conditions is of no little interest. Illnesses were very prevalent nearly half of the subjects had ascariasis, about one in five had bacillary dysentery and one in ten amoebic dysentery and giardiasis.

The origin of the outbreak, which took place in February and March 1948 was pickled fresh-water fish sold as herrings and eaten avidly. 20 to 30 per cent. of the displaced persons were affected. The clinical picture was that of an acute infection: malaise, chills, fever up to 40°C, anicteric, enlarged and tender liver, eosinophilia from 10 to 40 per cent., in one patient 68 per cent. Faecal examination was positive only after 3-4 weeks, the first symptoms being probably due to invasion of the biliary passages by metacercariae. After a few weeks the acute symptoms subsided, but general malaise and an eosinophilia of 4-10 per cent. remained.

The infection seemed to pass the way for other intestinal infections, for giardiasis, enteritis and *E. histolytica* increased also almost pari passu. Over 7,500 faecal examinations were made in 18 months.

Treatment was not very satisfactory. Certain violet seemed to give some relief and combined treatment with emetine, yarten, carbazone and streptomycin might be useful. Antimony compounds proved very disappointing.

H. Harold Scott

TILLMAN, A J B & PHILLIPS, H S Pulmonary Paragonimiasis *Amer J Med* 1948, Aug, v 5, No 2, 167-87, 4 figs

The authors give a short systematic account of paragonimiasis, and refer to the special features that were noted in twelve cases among Filipino guerrillas in a hospital in Leyte

In five patients, the first onset of symptoms was associated with a febrile attack which was probably malaria when the fever subsided the lung symptoms, cough and haemoptysis, remained and developed The cough was dry at first but rapidly became productive, with 30 to 90 ml of sputum, which was usually "gelatinous, purulent, bloody and of a slightly sour odour in which were scattered dark brown flecks resembling cigarette tobacco shreds" Ova were found in such sputum The cough tended to be worse after exertion and at night Most patients had chest pains Dyspnoea was associated with pleural effusion in three patients Two patients complained of pain in the extremities

Despite the symptoms most patients seemed relatively well Physical signs were present in the lungs at some time in every patient—fine to coarse râles in varying portions of the lungs "Characteristic signs" of fluid were noted in two patients, but fluid was apparently present in four cases An enlarged liver was found in three cases

Ova were found in sputum, faeces and pleural fluid They were found—sometimes not until the 10th examination—in the sputum in all cases, in the faeces in four cases (7 times in a total of 71 stool examinations), and in the pleural fluid in one case

The significance of the blood findings was not clear since all had multiple parasitic infections Eosinophilia was constant in one case only (maximum 8 per cent) was the percentage consistently less than 12 and the maximum was 56 The blood sedimentation rate was above 20 mm in 10 cases In four there was a reversal of the albumin/globulin ratio and in all but two it fell below 2.0 The formol gel test was positive in two cases

Radiological changes were present in every case, there were either massive areas of density, or diffuse, small, soft and usually multiple lesions Both lungs were involved in five patients the right lung and the lower lobes were most frequently involved The lesions diminished during treatment in five cases, disappearing in three

Tartar emetic was given intravenously in 4 cases, it was badly tolerated and had little effect Emetine hydrochloride was thereafter adopted as the treatment of choice Daily injections of 0.06 gramme for 8 or 9 days was the usual course Symptomatic relief occurred in nine cases, usually after the first few injections Constant absence of ova was noted in three cases after repeated courses of emetine The twelve case reports are given in detail [The paper contains much other valuable data, but the reader may be prejudiced by the fact that Sir Patrick Manson is referred to twice as Mason] L E Napier

KOURI P Diagnostico epidemiologia y profilaxis de la fascioliasis hepatica humana en Cuba. Síndrome eosinofílico febril [Diagnosis, Epidemiology and Prevention of Human *Fasciola hepatica* Infection in Cuba The "Febrile Eosinophilic Syndrome"] *Rev Cubana Lab Clin* 1949 Jan-Feb-Mar, v 3 No 1 12-32 8 figs [57 refs]

A general review of the subject with illustrations of technique

See also p 677, SANDERS, A Survey of Helminth and Protozoan Incidence in Man and Dogs at Fort Chipewyan, Alberta

KUTTENEN EKBAUM, L. A Case of *Diphylidium caninum* in a Child. *Canada J. Pub. Health* 1949 Mar v 40 No. 3 115-16.

HALAWANI, A., BASI, I., HAFEZ, A. & SHAWARBI, M. K. Treatment of Tape Worms with Atebrine. *J. Roy. Egyptian Med. Ass.* 1948, Dec., v 31 No. 12, 956-60.

There is no drug which is completely satisfactory for the treatment of a tape-worm infestation. Success in treatment depends on the proper preparation of the patient by complete abstinence from solid food for 48 hours, and proper clearance of the bowel, before the administration of the vermifuge.

A dose of atebrine [mepacrine] of 15 mgm./kilo of body weight given in gelatin capsules or coated tablets after proper preparation, followed within a couple of hours by 1 to 2 ounces of castor oil, or by a large dose of magnesium sulphate, proved effective in removing entire worms with heads from 33 of 53 patients so treated. These worms proved to be both *Taenia saginata* (about 50 worms) and *T. solium* (5 worms). Most worms were evacuated on the day of treatment, but one was passed complete with head on the seventh day after it. The failures in many cases, were probably due to inadequate preparation of the patient before administration of the drug.

Two patients suffered from toxic side effects in the form of vomiting in both cases ascribable to excessive absorption of the drug. J. R. D. ADAMS

PÉREZ FONTANA, V. Origen desarrollo y extensión de la hidatidosis en América. [Origin, Development and Extension of Hydatidosis in America.] *Bolet. Oficina Sanitaria Panamericana.* 1949 Feb. v 28, No. 2, 1-4 56, 1 fig. 4 graphs & 10 charts. (14 refs.) English summary.

The English summary appended to the paper is as follows:—

The report is written in two parts. First, a brief study is given on the biology and morphology of the parasite (etiological agent of the disease (*Taenia Echinococcus granulosus*)) its anatomic dissection and the systemic reactions produced. In the second part the author reviews, historically, geographically and epidemiologically, the development and extension of the hydatid disease in the South American Continent. The disease was probably introduced to America by dogs brought by whalers who settled on both banks of the River Plate and it extended slowly to the neighboring countries. Charts and illustration are presented showing the extension of the disease among cattle and men. Epidemiological and ecological considerations are made with regard to the factors which determine the extension of the disease in the American Continent."

See also p. 694 LERMAN, Macrocytic Anemia in Central Africans in relation to Ancylostomiasis and other Diseases.

NAUER, L. E. *Strongyloides stercoralis* Infection. Part I. *J. Trop. Med. & Hyg.* 1949 Feb v 52, No. 2, 25-30 1 fig. Part II. Strongyloidiasis among Ex Prisoners of War. *Ibid.* Mar v 52, No. 3 45-8.

L. British workers have regarded human strongyloidiasis as of minor clinical significance but American workers have attributed important pathological potentialities to it. The author now shares their view and has been

further confirmed in it by his observations on ex-prisoners-of-war from the East. *Strongyloides stercoralis* infection, like hookworm infestation, occurs widely throughout the humid tropics, Indo-China, Siam, Burma, and Assam are among the areas of the world most heavily infected.

The life cycle of *S. stercoralis* is characterized by extraordinary variation. The normal infective stage of the parasite is the filariform larva, this develops from the rhabditoid larva outside the host, penetrates the skin or mucosal surfaces, reaches the blood stream and is carried to the lungs, where it penetrates into an alveolus. Here a mature male or female may develop, but more commonly this development occurs only after the larva has migrated up the respiratory passages and descended the alimentary tract to the small intestine. The gravid females, in the mucosa of a bronchus or the mucosa of the gut wall, deposit eggs which rapidly hatch rhabditoid larvae. The larvae deposited in the gut wall normally escape to the exterior in the faeces there to undergo an exogenous cycle, but they do not always so escape. They may remain in the tissues, reach the blood stream and recommence the cycle (direct endo-autoinfection), changing through the filariform stage to the adult in the process. Alternatively they may pass down the gut and develop to filariform larvae within the lumen of the bowel, to repenetrate it at a lower level and so continue the cycle (indirect endo-autoinfection). Again, the larvae may develop to the filariform type in faecal matter contaminating the perianal skin, and repenetrate the skin without undergoing an exogenous cycle (exo-autoinfection). By any of these means the worm infestation of the host may be increased without an exogenous parasitic cycle having taken place, a phenomenon which is unique in helminth infestations.

The exogenous cycle is also subject to variation. The rhabditoid larvae voided in faeces on reaching soil may become filariform and remain as such, now being infective, or they may develop to free-living adult males and females and undergo several such cycles while living in soil.

In view of the variations which may occur in the cycle in man, repeated stool examinations over some weeks may be necessary for the detection of an infestation.

The administration of the usual anthelmintics designed to destroy the parasites in the lumen of the gut is unlikely to be effective, as the worms are located parenterally for most of their parasitic lives.

The pathological lesions due to *S. stercoralis* occur at the chief sites of activity of the worm, viz (1) at the point of entry into the skin, (2) in the lungs and bronchi, and (3) in the intestinal mucosa. Petechial haemorrhages with local inflammatory changes occur at these sites, and the symptoms may be acute and of short duration, or chronic. In heavy infections of the gut there may be extensive sloughing, and ulceration may follow secondary bacterial infection, rarely, ileus or gangrene may follow penetration of the muscularis mucosae by larvae when direct or indirect endo-autoinfection occurs on a large scale. While infections in some cases are symptomless, more commonly there are indefinite digestive disturbances and ill-health, subject to periodic exacerbation. There is almost invariably eosinophilia (8 to 25 per cent) and moderate anaemia. The stools of any patient from a known endemic area, who has suggestive symptoms and eosinophilia, should be thoroughly and repeatedly examined for larvae.

Treatment is unsatisfactory, and gentian violet by the mouth and antimony parenterally would logically appear to afford the greatest hope of destroying the parasites. In practice they have proved of doubtful value. Eventual spontaneous cure occurs as a rule, although the infection may persist for years.

11 Strongyloidiasis is common among ex-prisoners-of-war from the Far East, at least 90 per cent of those infected acquired their infections in Siam,

where it is estimated that between 25 and 100 per cent of the men working on the railway were infected. The symptoms complained of are usually vague and mild, but often are associated with periodic watery diarrhoea. An outstanding and exceptional manifestation however was a periodic transient urticarial eruption first occurring within 12 inches of the anal orifice and often extending to the trunk or thighs. In many cases it resembled the creeping eruption due to *Ancylostoma braziliense* and its linear progress could be followed over a considerable distance at the rate of an inch in $\frac{1}{2}$ to 1 hour. In other cases transitory urticarial wheals appeared. Eosinophilia increased during the urticarial attacks. The attacks have recurred, though at increasing intervals, in some patients over a period of three years observation. Apart from a few cases which have cleared up with large doses of antimony or of gentian violet treatment has proved disappointing. The intensity of the gut infections in these men on the whole has diminished, and there has been no solid evidence of increased worm load due to auto-infection in any case.

The association between these skin manifestations and a strongyloid infection acquired in Siam is 100 per cent. Periodic petechial urticarial, or linear eruptions with a bathing drawers distribution in ex-prisoners from Siam have invariably been followed by the discovery of strongyloids larvae in the stools. The limited geographical area from which men suffering from these peculiar skin lesions were drawn suggested that a distinct species of *Strongyloides* might be responsible: there was no morphological evidence on examination of the parasites that this was the case. The origin of the eruptions may be (1) penetration of the skin by rhabditoid larvae (exo-autoinfection) (2) migration of larvae entering the skin (exo-autoinfection) or even the gut (endo-autoinfection) near the anus (3) allergic reactions precipitated by the periodic systemic migrations of worms or (4) an unassociated infection acquired in the same area. The second explanation seems the most satisfactory in view of the creeping nature of the eruption in many cases, but in no case has a larva been recovered from the lesions.

A. R. D. Adams

CAPLAN J. P. Creeping Eruption and Intestinal Strongyloidiasis.
(Memorandum. *Brit Med J* 1949 Mar 4 389.)

Creeping eruption resulting from exposure to the larvae of certain hookworms is well recognized.

In January 1948 the author noted the occurrence of tortuous urticarial wheals in ex-prisoners of war from the Far East. These wheals usually started on the buttocks and extended upwards towards the iliac crest on to the abdomen and back and down to the middle of the thighs. The lesions were very unstable. They moved at a speed of 5-10 cm. per hour, this is far greater speed than is usually described for creeping eruption. The eosinophil count were usually between 700 and 2,000 per cmm. (10-25 per cent.)

The first man in whom this was observed had worked on the Siam Burma railway and had both a hookworm and a strongyloid infection. The former infection responded to treatment but the latter did not and the creeping eruption persisted. The author observed that this creeping eruption was almost exclusively confined to men who had been prisoners of war in Siam. He found the condition in several hundred of them, and in over 80 per cent he was able to demonstrate a bowel infection with *S. stercoralis*. The identity of the species was confirmed by Professor Buckley. It has so far not been possible to demonstrate strongyloides larvae in the lesion and even presumptive proof is lacking as it has been impossible to find any method of treatment which will eradicate the intestinal strongyloidiasis. The lesion responded to symptomatic treatment with the antihistamine group of drugs.

L. E. 44/40

PAUTRIZEL, R & MAYER, G Les manifestations cutanées provoquées chez le cobaye par injections intradermiques d'extraits vermineux [Cutaneous Manifestations in the Guineapig caused by Intradermal Injections of Worm Extracts] *C R Soc Biol* 1948, Dec, v 142, Nos 23/24, 1551-2

The following is a translation of the authors' summary —

Intradermal injection of clean guineapigs with fractionated ascarid extracts provokes an intense leucocytosis involving all varieties of white cells. Similar injections made on guineapigs previously sensitized with the same extracts result in a considerable eosinophile infiltration, together with modifications of collagen fibres. These eosinophilic infiltrations do not appear after intradermal injections of cestode extracts are made on animals sensitized with nematode extracts
H J O'D Burke-Gaffney

PAUTRIZEL, R & MAYER, G Action d'un antihistaminique de synthèse sur les manifestations cutanées chez le cobaye par l'injection intradermique d'extraits ascaridiens [Action of a Synthetic Anti-Histamine Substance on the Cutaneous Manifestations in the Guineapig caused by Intradermal Injections of Ascarid Extracts] *C R Soc Biol* 1948, Dec, v 142, Nos 23/24, 1552-3

The following is a translation of the authors' summary —

The synthetic anti-histamine substance 3277 R P decreases the intensity of the cutaneous manifestations provoked by intradermal injection of ascarid extracts in guineapigs sensitized to these extracts. In particular, the amount and extent of the leucocytic infiltration are reduced.

H J O'D Burke-Gaffney

PAUTRIZEL, R & BAILLENGER, J Recherches sur l'hémotoxine ascaridienne [Studies on the Haemotoxin of *Ascaris*] *C R Soc Biol* 1948, Dec, v 142, Nos 23/24, 1550

Different explanations have been put forward for the appearance of anaemia in helminthic diseases, a common one being that the worms secrete a haemotoxin but not all authors accept this explanation.

FISHBACK [this *Bulletin*, 1931, v 28, 225] reported the isolation from *Ascaris lumbricoides*, dried in a current of hot air, of a complex which was haemolytic *in vitro*. The present author asks whether this haemolytic complex was not in fact derived from bacteria present in the digestive tube of the worm.

He found that when an aqueous extract of *Ascaris* freshly prepared and stored at 4°C or an aseptically taken specimen of coelomic fluid was added to a red-cell suspension, no haemolysis was observed. On the other hand, the aqueous extract, left at 37°C for 24 hours was able to produce haemolysis. This seemed to suggest that the haemolytic property was related to the development of bacteria.

To test this hypothesis, he isolated bacteria from the digestive tube of *Ascaris* and maintained them on agar. These organisms were members of the *Proteus* group. A freshly prepared aqueous extract was sterilized at 120°C for 15 minutes. This extract had no haemolytic action, even when left at 37°C for several weeks. On the other hand, haemolytic properties appeared within a few hours if the extract was seeded with the *Proteus* isolated from the *Ascaris* itself and incubated at 37°C.

The author concludes that the haemolytic properties identified in extracts of *Leish* by different workers appear to be due to the presence of organisms of the *Proteus* group which are natural contaminants of the extracts.

H J O D Burke-Gaffney

HENNEY M & HEWITT R. Treatment of Bancroftian Filariasis with Hetrazan in British Guiana. *Amer J Trop Med* 1949 Jan., v 29 No. 1 89-114. [71 refs.]

The result of trials with Hetrazan against Bancroftian filariasis in patients from British Guiana justify some degree of optimism. However in very few cases recurrence of symptoms existing previous to treatment four months after cessation suggests that some adult worms have survived. Reduction in numbers of microfilariae of *B. bancrofti* is invariable with Hetrazan but the degree of the initial microfilaraemia and the amount of drug within the range of 0.5 to 2.0 mgm. per kgm. are of little significance in this reduction. High initial counts (above 100 microfilariae per 60 cmm) are less likely to show a reduction of 100 per cent. on the second day of treatment but this varies in individuals. Few patients showed any microfilariae after one week of treatment and the microfilarial counts remained negative or at low levels as long as follow-up examinations were made (up to 4 months after cessation).

It is believed that the effect of Hetrazan against the microfilariae of *B. bancrofti* is direct since it occurs so rapidly. The systemic reactions which are presumed to be caused by the death of adult worms frequently do not occur until treatment has progressed for one or more weeks and the microfilariae have been cleared from the peripheral blood. No theories can at present be advanced regarding the mode of action of Hetrazan against microfilariae as it is practically ineffective in low dilutions *in vitro* against microfilariae of *L. carinii* and *D. immitis* but does produce an observable *in vitro* effect on the microfilariae of *Toxotia dolacris*. Several puzzling features have been recorded regarding the specificity of Hetrazan for various types of human microfilariae. It is effective against the microfilariae of *O. rotundus* and *L. loa* in the same doses as for *B. bancrofti* but it is not effective against *A. persici* or *M. olandi* in the same doses, though higher doses might be so. If no other effect were produced other than that of rapidly reducing microfilariae in the blood the potential usefulness of such an effect in the control of filarial transmission in endemic areas is obvious.

It is known that Hetrazan has low toxicity in laboratory animals and that comparatively enormous doses are required to produce any evidence of damage. It is rapidly absorbed and excreted rapidly and exhibits no known cumulative effects. In therapeutic doses in man few side reactions have been observed.

Six volunteers, with no worm infections took single doses of from 6 to 10 mgm. per kilo and had headaches nausea vomiting malaise anorexia and lassitude.

The occurrence of pains in various parts of the body temporary swellings localized rashes nodular swellings and the temporary aggravation of pre-treatment swellings during Hetrazan treatment suggest that many of the adult worms were killed. It will be remembered that similar reactions were noted in untreated filarial cases in the S. Pacific area during the recent war and dead adult worms were removed from the sites of nodular swellings (this Bulletin 1941 41 946 1946 43 353).

The site of nodular swellings lymphatic adenitis uveitis, and accompanying symptoms which occur during treatment with Hetrazan may denote the position of the adult worms within the lymphatic. A parallel has been observed that in non-treated cases the exacerbation of symptoms coincided

with the disappearance of microfilariae is brought about by the death of the adult worms. The relative innocuous systemic reactions during treatment with asymptomatic reactions, regardless of the initial degree of microfilaraemia, suggest that these cases were considerably less sensitized to filarial protein than were the remaining groups of cases with histories of clinical symptoms at the time treatment was begun. The fever which occurred in these patients is probably related to the destruction of microfilariae. Polyuria which occurs in both asymptomatic and clinical groups is probably due to a true diuretic action of the drug.

Cutaneous manifestations seemed to respond to anti-histamine treatment with benadryl and ephedrine. The most dramatic and unexpected result of Hetrazan treatment was the partial recession or complete disappearance of pre-treatment swellings in a large proportion of cases. These ranged from partial diminution of swellings and softening of indurated parts to complete recession of swollen glands, swollen arms or legs, swollen spermatic cords and hydroceles, at varying periods during the course of treatment or after it had ceased.

The improvement in advanced cases of elephantiasis after treatment with Hetrazan may invite a complete revision of some of the contemporary conceptions of its pathology.

It is believed by some that the swelling in elephantiasis is due to the obstruction of lymphatics by dead or living filariae, sometimes complicated by secondary streptococcal infections. It is suggested from the effects produced by Hetrazan that the swelling is due, in some cases at least, to the presence of live worms which slowly release a foreign protein and produce allergic reactions resulting in chronic inflammation and oedema.

A part or all of the swelling is reversible after the source of inflammation is removed, even in old chronic cases. The time for the recession differs in different individuals, occurring in two weeks in some and several months after treatment in others.

Symptoms recurring in patients after cessation of treatment have been infrequent so far.

Eight patients have exhibited definite filarial attacks from 16 days to 2 months after treatment was stopped, and in 2 cases swellings recurred after they had been reduced by treatment. It is apparent that in these cases all adult worms had not been killed.

Recurring febrile attacks, subcutaneous nodules and generalized body pains were probably all of filarial origin and responded quickly to treatment with Hetrazan and complete relief was obtained.

During treatment many developed swellings in parts of the body where they had hitherto not existed, but with the exception of two these disappeared completely during the course of treatment. It was suggested that pre-treatment sensitization to filarial protein was intensified by a further increased amount of the same protein. These flare-ups subsided quickly.

These general conclusions are based upon a study of 296 cases of Bancroftian filariasis treated with Hetrazan in British Guiana. Rapid reductions of microfilariae were obtained when oral doses of 0.2 to 2.0 mgm per kgm of Hetrazan were given three times daily. Most cases treated with 0.4 mgm per kgm or higher showed negative counts one week after treatment had started. With a dosage of 0.2 mgm per kgm three times daily for three weeks or longer microfilariae may recur in small numbers at varying times after treatment has been stopped.

Atypical clinical manifestations of filariasis, simulating malaria, arthritis, or cutaneous diseases may be encountered in hyperendemic regions. These frequently respond to Hetrazan treatment.

P. Manson-Bahr

Mazzotti L. Posibilidad de utilizar como medio diagnostico auxiliar en la oncocercosis las reacciones alergicas con-convencidas a la administracion del Hetrazan. [Allergic Signs after Hetrazan as a Subsidiary Diagnostic Measure in Onchocerciasis.] *Rev Inst Salubridad y Enfermedades Trop Mexico* 1948 Sept., v 9 No 3 235-7

In some patients infested with *Onchocerca* cutaneous biopsy is negative in result and nodules may not be present for examination having been already extirpated. Skin reactions and complement fixation tests may give false positives if the subject harbours other nematodes.

The author has observed that administration of Hetrazan (1 diethylcarbamid 4 methyl piperazine) to patients harbouring *Onchocerca* gives rise to allergic phenomena in a few hours—cutaneous oedema and erythema like erysipelatos patches if the eyes are involved they are almost closed by swelling of the lids there is conjunctival congestion axillary and inguinal adenitis, pains in muscles and joints and a rise of temperature to 39 C. The degree of reaction apparently varies with the degree of infection. These reactions were seen in 59 out of 65 patients and they faded within 5 days. These results were not seen when the drug was tried on patients with hookworm, *Ascari*, *Enterobius*, *Trichuris*, *Strongyloides* or *Microfilaria* *ozardi* but IF Bancroft gives a similar reaction. The author concludes that in the absence of this last infection if allergic symptoms follow the administration of a single dose of 4 mgm. per kilo body weight this is a valuable sign of infestation by *Onchocerca*.

II Harold Scott

De Wit J C De doeltreffendheid van de behandeling van actieve oxyuriasis met vermicifera in de praktijk. [The Practical Value of treating Active Oxyuriasis with Vermicifera.] *Nederl Tijdschr v Geneesk* 1949 Apr 16 v 93 (II) No. 16 1234-40 17 refs.

The English summary appended to the paper is as follows —

"The author has treated two groups of 25 adult and two groups of 40 children suffering from active oxyuriasis with gentian violet and phenothiazin respectively (two cures courses with a three weeks interval followed by control during one year). It appeared that phenothiazin is considerably more effective as a vermicide than gentian violet so that fewer relapses take place. The chances of infection however are so great that after a year 85 per cent of the patients in the gentian violet as well as in the phenothiazin groups were positive again, the number of patient without complaint then amounting to 30 per cent in both groups just as the number of worm carrier without complaints.

"Taking into account that phenothiazin in a dosage of 50 mg per kg body weight still gives light toxic symptoms it seems indicated to reserve this medicament for very serious cases of active oxyuriasis where quick results have to be obtained. However the cures are not permanent the solution of the oxyuris problem has to be sought in hygienic rather than in pharmacological measures."

Larsen J E Jr & Hendrick J R The Probable Explanation for the Difference in the Localization of Adult Trichinella p. m. in Young and Old Mice. *J Parasitology* 1949 16 35 N 1 101-6 10 refs.

Studies are described showing a distinct difference in the localization of adult *Trichinella spiralis* in young and old mice. In young mice significantly greater numbers were found in the posterior one half of the small intestine

(average 69.5 per cent), while the reverse was true in old mice (average 18.7 per cent). Therefore, age apparently is a factor involved in this localization. Approximately the same percentage development of adult worms was found in mice of both age groups, showing no evidence of age resistance.

"In an attempt to demonstrate the mechanism of this difference in distribution, a study was made of the role of intestinal emptying time which is known to differ considerably in young and old mice. A reversal in distribution was shown in young mice by artificially decreasing their intestinal emptying time with morphine sulphate. In this case approximately 95 per cent of the worms were located in the anterior one-half of the small intestine. Although a direct comparison with old mice was not made, these results would seem to indicate that the difference in localization of the adult worms in mice of the two age groups is due chiefly to the difference in intestinal emptying time."

RIEDEL, B. B. Milk as a Source of some Protection against the Acquisition of *Trichinella spiralis* in Mice. *J Parasitology* 1949, Feb., v 35, No 1, 27-30.

"The effect of milk upon resistance of mice toward *Trichinella spiralis* was studied. On the sixth day after parasitism with 100 ± 8 cysts the average numbers of adult parasites harbored indicated that mice fed a commercial ration supplemented with whole milk harbored about the same numbers of adult parasites as mice fed the same ration supplemented with water. The smaller average numbers of larvae harbored 28 days after infection showed that whole milk supplementing a commercial, rat ration prevented many of the larvae from entering the general musculature of the mice."

GURSCH, O. F. Intestinal Phase of *Trichinella spiralis* (Owen, 1835) Railliet, 1895. *J Parasitology* 1949, Feb., v 35, No 1, 19-26, 2 figs & 2 pls [15 refs].

"The results of these experiments demonstrated that in general the greatest percentage of recovery of *Trichinella spiralis* was from the first quarter section of the small intestine, and that the percentage of worms recovered from the following sections declined steadily.

The larvae penetrated the mucosa immediately after ingestion. After 22 and 24 hours of infection, the worms were found again in the lumen. Subsequently, females as well as males penetrated the mucosa and caused extensive destruction of villi.

"After two days of infection, the adults recovered revealed a ratio of two females to one male. Even among those which were eliminated, that is, found in the cecum and large intestine, there were always more females than males."

LARSH, J. E. JR & KENT, D. E. The Effect of Alcohol on Natural and Acquired Immunity of Mice to Infection with *Trichinella spiralis*. *J Parasitology* 1949, Feb., v 35, No 1 45-53.

DEFICIENCY DISEASES

BASSI, G. Some Aspects of Glossitis caused by Vitamin Deficiency. *Internat Ztschr f Vitaminf* Berne, 1949, v 20, No 4, 444-7, 4 coloured figs on 2 pls.

"Glossitis is an important and early sign of vitamin deficiency, pointing to several causes. The least frequent is exogenous deficiency (insufficient intake of

the vitamin) which is practically never observed in Europeans as is shown by the examination of prisoners and internees from German camps. More frequently it is caused by an imbalance in intermediary metabolism in certain pathological conditions caused by, for example diseases of the intestine and the liver etc. Of great importance is deficiency caused by cellular inability to utilize the vitamin through constitutional imperfections particularly in people with hereditary tendencies (sons of syphilitics or alcoholics or mongoloid and negroid types) and in patients with a tendency to splitting of the function tissues. In all these there enters a factor that is neither exogenic nor intermediary but is linked with the peripheral cells ('dergential imbalance').

VALTER R. W. MUELLER, J. F. & REAN W. B. The Therapeutic Effect of Tryptophane in Human Pellagra. *J. Lab. & Clin. Med.* 1939 Mar., v 34 No. 3 400-13 (13 refs.)

Tryptophane in 6 Gm. oral doses induced a remission in typical acute pellagrous lesions.

It caused an increased excretion of N^1 -methylnicotinamide in the urine of pellagrins at a slower rate but in the same manner as in normal persons.

"These observations suggest that tryptophane and niacin are closely related in their role in human as well as in animal nutrition."

SPRUE

STEFANINI M. Clinical Features and Pathogenesis of Tropical Sprue. *Observations on a Series of Cases among Indian Prisoners of War in India. Vallone* 1948, Dec. v 27 No. 4 379-477 4 figs. (23 refs.)

Between March and June 1942, 12,500 Italian prisoners of war were transferred from various stations in India to a camp in Volhangra Valley, where they remained until the beginning of 1946. This camp was situated at 4,000 feet in the Himalayan foothills where the humidity was high, especially during the rainy season, but the winter season from December to February was usually cold and rainy followed by two months of dry weather.

The water supply was classified as oligomineral not containing mica or silicon in excess.

After one year's residence in the area a large number of Italians developed goitre of the parenchymatous type and the number increased progressively even after salt fortified with iodine was obtained. Bacillary dysentery, benign tertian malaria, renal calculus and acute appendicitis were the most common causes of admission to hospital. Surveys of the nutritional status were carried out every six months. The chief complaint was slight continuous loss of weight though no signs of starvation nor of specific deficiencies were observed. Haematological data from 100 persons at random revealed a mild normocytic anaemia.

The first cases of tropical sprue were diagnosed in September 1942 and from then until the end of April 1943 a total of 1,069 cases of varying severity were encountered. Of these 268 were admitted to hospital. The length of time that the prisoners were resident in the area bore a direct relationship to the number of new cases; furthermore the incidence was clearly related to the atmospheric conditions for most of the cases occurred during and after the rainy season. The prisoners aged from 25 to 35 years showed a relatively greater number of new cases and relapses. The most serious cases were found in the oldest age

group, in which 80 per cent of the patients who died were between 50 and 55 years of age

One or more relapses, usually during or immediately after the rainy season were observed in 134 cases (12 per cent). Death occurred in five, from aplastic anaemia. The past history was not helpful. 6 per cent had suffered from bacillary dysentery during the year preceding the onset and 0.7 per cent had chronic amoebic dysentery.

The recent history was rather uniform. Patients usually reported to hospital complaining of severe, uncontrollable diarrhoea, accompanied by distressing meteorism. Other symptoms were sudden severe asthenia, extreme irritability, nervousness and tenesmus. Many experienced difficulty in feeding themselves because of dysphagia.

The first stage of the disease is characterized by fatty diarrhoea and other early signs of intestinal malabsorption. The second is a multiple deficiency picture, while the third is a complex deficiency syndrome dominated by a hyperchromic anaemia typical of the full-blown picture of tropical sprue.

Among the symptoms of deficiency noted in the second stage, glossitis was present in 90 per cent, small aphthae were observed, angular stomatitis with or without cheilosis was recorded in 27, and proctoscopic examination of patients complaining of tenesmus revealed a reddened and congested rectal mucosa. Several patients exhibited exfoliative dermatitis limited to the scrotum, thighs, abdomen, buttocks and dorsal surfaces of hands.

Studies of the haematological picture of 153 patients in the third stage revealed a hyperchromic macrocytic type of anaemia. The other results were as follows —

Mean corpuscular haemoglobin, $\gamma\gamma$	33.8 (20.04)
Mean corpuscular volume, $\mu\mu$	123.34 (94.06)
Volume index (84)	1.47 (1.02)
Mean corpuscular haemoglobin concentration, per cent	31.5 (37.9)
Saturation index	0.92 (1.15)

The values in brackets are calculated from the results obtained in 100 normal persons.

Sternal bone marrow biopsies were performed in 25 cases. With the exception of three, all showed typical erythroblastic arrest indistinguishable from that found in pernicious anaemia.

The serum calcium levels were always below normal, while the serum phosphorus values were within normal limits. Fasting blood sugar levels were consistently lower than normal.

The results of gastric analysis obtained in 97 cases showed mostly hypochlorhydria: there were six with histamine-responsive achlorhydria, and two with hyperchlorhydria.

Fat absorption and distribution of faecal fat were studied with difficulty in twenty cases. The average daily weight of stools was much higher than normal. The fat content was also increased, especially the third stage, but the ratio of split to unsplit fat was not much higher than normal. Despite the slight acid reaction of the faeces it was found that the split fat fraction consisted of soaps.

The average results showed that under the experimental conditions normal subjects absorbed approximately 90 per cent of dietary fat, whereas sprue patients absorbed only 66 per cent.

During the three-year period 112 suffered a relapse during or immediately after the rainy season: of these 23 relapsed each year at the same time.

Autopsies performed in five fatal cases did not furnish any essential information, and postmortem examinations probably do not reveal conditions bearing on the functional derangements underlying the clinical symptoms.

Prognosis was favourable especially when treatment was started early. A large number of cases have been followed since their repatriation to Italy and none has presented any further sign of activity of the syndrome.

Diet and rest formed the basis of treatment. Diet 1 high in animal proteins with protein/fat/carbohydrate ratio (P/F/C) of 1.0/0.23/0.93, was given to patients newly admitted to hospital with severe acute symptoms of the disease. Diet 2, which had a P/F/C ratio of 1.0/0.31/1.48 followed and continued till regression of active symptoms. Diet 3 with P/F/C ratio of 1.0/0.78/2.57 was given to all convalescent patients until clinical recovery appeared complete.

Fatty diarrhoea responded to diet alone. Sulphaguanidine was given to 173 patients in a dose of 4 gm. initially 2 gm. every three hours on the first day and 1 gm. every three hours on the three following days and resulted in arrest of the diarrhoea and a feeling of well-being. Probably the action of the drug consists in suppressing the secondary infections which may be responsible for the severity of the diarrhoea.

Response to liver therapy was satisfactory but less so in the third stage of the disease. Relief from diarrhoea and meteorism was obtained in from 7 to 10 days. Seventeen out of 153 patients did not respond to parenteral liver therapy. This number includes five who developed aplastic anaemia and the four who became chronic. The remaining eight cases who had severe macrocytic anaemia showed only a moderate reticulocyte response until they received transfusion or intramuscular injections of small quantities of blood. Full scale therapy had practically no effect in the 4 chronic cases. The dietary observation confirms the fact that a high protein, low fat diet causes diminution in steatorrhoea probably on account of the lower fat intake so that with diminution of the irritant of fatty material in the intestine diminution of the diarrhoea follows. The impression was confirmed that liver and yeast extract are highly effective.

Behaviour of oedema during treatment presented interesting features. In 43 cases occurrence of reticulocyte response and improvement of the haematological condition were accompanied by an extension of the oedema. Later it regressed with concomitant marked increase of diuresis till it finally disappeared completely in 25 to 30 days. It was found that extension of the oedema, not associated with albuminuria or hypertension was accompanied by a greater temporary fall of total serum proteins. This was possibly due to a greater demand of plastic material for active erythropoiesis. Relationship between hypoproteinaemia and extension of oedema under liver therapy was demonstrated by prompt regression of oedema after plasma transfusions.

The discussion of the results follows on familiar lines and reviews all the recent war time literature on tropical sprue and allied syndromes but does not lend itself to abstraction. It is concluded that dietary deficiency is known to be an important factor in the development of tropical sprue but it cannot be considered the only cause of the disease inasmuch as some peculiarities described in India during the war as for instance the epidemic of sprue in a particular season of the year or its sudden high incidence in military units shortly after their transfer to certain areas could not be explained on the basis of dietary deficiency alone. Local climatic and seasonal factors are therefore important in the pathogenesis of tropical sprue.

P. MASON R. R.

ZUCKERMAN, J. L., ZYMARIS, M. C. & VARELA, S. A Simple Method for the determination of Fecal Fat and Fatty Acids. *J. Lab. & Clin. Med.* 1949 Feb. v. 34, No. 2, 282-6.

The method presented yields results in 1 hour after the stool is dry and 40 routine determinations may be performed in a working day.

The procedure is as follows The stool is homogenized and a sample of about 2 gm is dried at 60°C overnight The dried material is pulverized and to a weighed sample (500 mgm) in a test tube with ground glass stopper are added 5 ml of N-HCl, 5 ml of a mixture of petroleum ether and ether (1:1) and 1 drop of 95 per cent ethyl alcohol The tube is stoppered and shaken for 25 minutes and then centrifuged for 15 minutes at 2,500 revolutions per minute The ether mixture layer is aspirated into a weighed beaker, and the extraction process is repeated with 5 ml of ether mixture The solvent is evaporated on a steam bath, and the fatty residue is weighed If free fatty acid determinations are required, the extracted fat is dissolved in 10 ml of ethyl alcohol and titrated with 0.1 N-NaOH

J H Birkinshaw

HEYERAAS, H Deficit av folic acid og K-vitamin ved symptomatisk sprue [Deficiency of Folic Acid and Vitamin K in Symptomatic Sprue] *Nordisk Med* 1949, Mar 4, v 41, No 9, 420-21 English summary

Report of a case

BIE, K Ileus hos spruepasient [Ileus in a Sprue Patient] *Nordisk Med* 1949 Mar 4 v 41, No 9, 418-19, 2 figs English summary

Report of a case

SUAREZ, R M, HERNANDEZ-MORALES, F, MARCHAND, E J, PEREZ SANTIAGO, E & TORREGROSA, M V The Effect of Pteroyldiglutamic Acid (Diopterin) in Sprue *Bol Asoc Med de Puerto Rico* 1948, Oct, v 40, No 10, 282-7

Diopterin is pteroyldiglutamic acid, which has been found to be only slightly active when assayed with *Lactobacillus casei* and *Streptococcus faecalis* The relative potential amount of free folic acid in Diopterin is approximately 77 per cent

The drug was given to six patients suffering from sprue either in the typical acute, or chronic stage in relapse, in doses of 50 to 200 mgm daily All six patients responded clinically and haematologically to the conjugate The sternal marrow also showed the change from a megaloblastic or erythroblastic arrest to a normoblastic stimulation, similar to that observed with folic acid or with parenteral liver extract An interesting observation was the presence of moderate or marked oedema of the legs during treatment and while the patient was showing definite improvement This may be related to changes in the plasma proteins

It appears from this small series that the daily oral administration of 50 mgm of Diopterin is probably an adequate dose in the treatment of sprue, especially when given together with a full sprue diet A capsule of 50 mgm of Diopterin is equivalent to 37.5 mgm of free folic acid.

P Manson-Bahr

HAEMATOLOGY

MACFARLANE, R G KING, E J, WOOTTON, I D P & GILCHRIST, M Determination of Haemoglobin III Reliability of Clinical and other Methods. *Lancet* 1948, Feb 21, 282-6, 1 fig [13 refs]

The authors have attempted to estimate the degree of reliability of various methods of estimating haemoglobin The factors that cause the variability in the results are discussed and the experiments were designed so that the effect of

each could be estimated separately, but in this paper they only deal with the total effect. Estimation of the iron content is generally accepted as the most reliable method of estimating haemoglobin and this has been used for judging the reliability of the various methods.

Eight large samples of "normal" blood were taken and divided between 16 representative observers in Oxford and 3 in London. Each of the Oxford workers estimated haemoglobin by 16 different methods, in 8 of which proprietary apparatuses were used and 8 were experimental methods. The instruments used were the Haldane-Gowers, Gowers-Sahli (Helbig), Tallquist, Tintometer, Dare 1, Dare 2 and Sahli-Zetka, and for the experimental methods the wedge colorimeter and the grey wedge photometer. With the two latter 5 different haemoglobin derivatives were used for estimation: carboxyhaemoglobin, cyanmethaemoglobin and alkaline haematin by both instruments, and acid haematin and oxyhaemoglobin each by one instrument. Each member of the London group estimated the haemoglobin by 5 different instruments: Duboscq colorimeter, Duboscq photometer, straight grey wedges, circular grey wedge and Sahli-Zetka. In the case of the first four instruments 4 different haemoglobin derivatives were used.

The results indicate that the dilution methods (Haldane-Gowers, Sahli) are the least satisfactory: differences of 10 per cent or more must be registered before they can be regarded as significant. Whole blood methods are slightly better than the dilution methods. The simple Tallquist is little worse than the elaborate and expensive Dare 1. Dare 2 is slightly better. The Sahli-Zetka is the best of the proprietary instruments.

Of the experimental methods the photometric are better than the colorimetric. The neutral grey photometer with either oxyhaemoglobin or alkaline haematin gave the best results in Oxford, but in London good results were obtained by the Duboscq photometer with all the haemoglobin derivatives and by the straight grey wedge with alkaline haematin and carboxyhaemoglobin. With these combinations differences of less than 5 per cent became significant.

J. E. Naylor

KING, E. J. GILCHRIST, M., WOOTTON, I. D. P., O'BRIEN, J. R. P., JOFF, H. M., QUELCH, P. E., PETERSON, J. M., STRANGEWAYS, D. H. & RAMSAY, W. N. M. Determination of Haemoglobin. IV. A Comparison of Methods for determining Iron Content and Oxygen Capacity of Blood. *Lancet* 1948 Mar 27 474-83. [22 refs.]

The best method of estimating haemoglobin in a sample of blood has been a subject of investigation for many years. The iron content and the oxygen capacity method have been those most frequently used. The accuracy and relationship of these methods has been investigated in London, Oxford, Edinburgh and Cardiff by a number of analysts. Pig, cow and human blood were used in these trials. The iron content was determined by the titanous chloride method and also by potassium dichromate titration and by an α -hydroxyquinoline semi-microgravimetric method. The oxygen capacities were estimated by the Van Slyke apparatus and by the Warburg apparatus. The total haemoglobin was also estimated after reduction with titanous citrate. Both saponin and a synthetic detergent were used for laking the blood. The carbon monoxide capacities were also estimated in Oxford.

Excellent agreement was found in the same specimens among three different analysts (analysts who used anations filter titanous blood titration method for estimating blood iron, a potassium dichromate iron titration technique and a hydroxyquinoline microgravimetric method agree well with the titanous chloride procedure).

" Van Slyke oxygen-capacity results, obtained by three different analysts, agreed and were on an average 3.5% or 0.7 ml of O_2 per 100 ml of normal pig blood lower than the oxygen capacity calculated from iron analysis. For human blood the difference averages 2.0% or 0.4 ml. of O_2 .

" An average difference of 1.1% or 0.23 ml of O_2 was found between Van Slyke oxygen capacity and Ramsay's 'total haemoglobin' method on 14 pig bloods." The discrepancy between the iron and the oxygen methods is thus not entirely due to methaemoglobin which is included in this method.

" The Warburg apparatus may be used to measure oxygen capacity. It is less accurate than the Van Slyke method.

" No advantage was found in the substitution of a synthetic detergent for saponin in oxygen-capacity estimations.

" The carbon-monoxide-combining capacities of 6 human and 3 pig bloods were determined before and after reduction with sodium hydrosulphite. Some of these showed a slight increase in carbon monoxide capacity after reduction, two specimens showed a pronounced difference."

The object of this estimation is to determine the total haemoglobin present, since most temporarily inactive forms are capable of regeneration, the iron-content method is therefore more suitable as the standard base-line for judging the accuracy of clinical methods of estimating haemoglobin. It has the added advantage that it is less subject to fluctuations than the oxygen-capacity methods.

L E Napier

KING, E J, WOOTTON, I D P, DONALDSON, R, Sisson, R B & MACFARLANE, R G. **Determination of Haemoglobin VI. Test of the MRC Grey-Wedge Photometer.** *Lancet* 1948, Dec 18, 971-4, 4 figs [13 refs]

The experiments reported were designed to test the accuracy of the commercially produced Medical Research Council grey-wedge photometer. The experiments were carried out at the Postgraduate Medical School of London, and at the National Physical Laboratory, Teddington. Two instruments were used and 12 observers took part in the experiments.

The photometer is described. Its main feature is an annular grey wedge which is rotated until the light passing through it equalizes the light passing through the coloured fluid in a cell. A monochromatic light filter is fitted over the eyepiece to make this matching possible. It can be used with daylight or artificial light. In the latter case a specially designed lamp is fitted to the instrument.

The results are shown on a histogram, a figure, and a table. The histogram shows that at least 90 per cent of the 120 observations with artificial light fall within ± 2 per cent of the true value and that no individual error is greater than 4 per cent. With daylight the result is almost as good, three observations are 5 per cent above the true value.

None of the eight observers who went through the whole experiment showed any pronounced bias in favour of higher or lower estimates than the true values.

The authors issue a warning that in clinical practice the errors are likely to be larger since in this trial errors associated with the taking of peripheral blood were eliminated by the use of venous blood, and special care was taken in ensuring accurate pipetting and cleaning of the instruments. [See also this *Bulletin*, 1948, v 45, 359, for previous reference to this series]

L E Napier

MED Trop Marseille 1948, Nov-Dec., v 8 No. 5, 707-12. Nomenclature des cellules sanguines. [Nomenclature of Blood Cells.]

A detailed nomenclature prepared by a Committee established by the French Minister of Public Health.

VAGATY J. L. F. & ZAKATY A. F. The Treatment of Polycythaemia Vera. A Record of One Case treated with *Ancylostoma* Infection. *Trans Roy Soc Trop Med & Hyg* 1949 Mar., v 4, No. 3 493-9

A number of methods of treatment for polycythaemia vera have been used none has been uniformly successful. DUPON *et al* (this Bulletin 1940 v 37 598) tried treatment by inducing a hookworm infection the present authors report a case in which this treatment was again tried.

The patient was 55 years of age and had apparently suffered from polycythaemia vera for 10 years when seen by the authors he showed a typical clinical and blood picture of the condition. His stools showed a few *Heterophyes heterophyes* ova only. Between 30th April, 1946 and 14th May, 1946, 650 larvae from a culture of *Ancylostoma duodenale* were applied in drops of fresh water to his hands, feet, abdomen and back and the drops allowed to dry. (On 15th June 1946 200 ml. of blood was withdrawn by venesection to relieve symptoms.) On 23rd September 1946 it was calculated from a stool egg count that he had 32 adult ancylostomes. There was a slight fall in the total red-cell count from 8×10^6 to below 7×10^6 , a moderate leucocytosis (the increase being due to eosinophils which had risen from 1 per cent. to 30 i 83 per cent. Three hundred more larvae were applied to the abdomen between November and December and in February 1947 the egg count indicated 67 adult worms. There was a further drop in the blood count which was now 8 100 000 per cmm. After two more applications of larvae of 250 each to the abdomen in February there was a rise in the egg count which on 14th April, 1947 indicated the presence of 420 adult ancylostomes and a further drop in the blood count to 5 100 000 per cmm. with 83 per cent. haemoglobin on 8th June 1947. The final count on 5th November 1947 showed 5,000 000 red cells per cmm. 60 per cent haemoglobin (originally 140 per cent.) 12,000 leucocytes per cmm. with 27 per cent. eosinophils. There was a corresponding relief of symptoms the man looked and felt better he had no headaches, giddiness, or palpitations and he was more efficient at his work but he was still unfit for prolonged work.

L. E. V. *per*

ZIMMERMAN S. P. & DEGGAN, S. Pernicious Anaemia in the Tropical Negro. *Arch Intern Med* 1949 Aug v 82, No. 2, 184-95 (chart R in footnotes.)

1. Ten cases of pernicious anaemia in the tropical Negro are presented.
2. No essential differences were brought out in the manifestations of the disease in Negroes and in other races.
3. Pernicious anaemia does occur in tropical natives, and further study and increased awareness will cause it to be more frequently recognized."

LEHMANN H. Macrocytic Anaemia in Central Africans in relation to *Ancylostomiasis* and other Diseases. *Lancet* 1949 Jan 15 90-93 4 figs. [4 refs.]

Forty-four cases of severe anaemia in Uganda were studied. The patients were all over the age of 17 years and their haemoglobin was below 7 gm. per 100 ml. Control examinations on 77 well nourished Africans showed the blood

pictures of all to be within the limits accepted as normal in Europe and India. Six of the controls had sickle cells compared with seven of the 44 anaemic patients.

The cause of the anaemia in 32 was ankylostomiasis and there was iron deficiency, in six others, this infection was complicated by malaria or a bacterial infection, and in the remaining six the anaemia was due to malaria or bacterial infection and there was no iron deficiency.

The author claims that —

"The macrocytes in Central African anaemia are reticulocytes and young cells in general, emitted by an efficiently functioning bone-marrow into a periphery where constant blood-loss occurs."

He calls these macrocytes "coctic" cells and points out the difference between them and the megalocytes of pernicious anaemia and "nutritional macrocytic anaemia of Wills", the main differentiating features are a low MCHC and the absence of any associated megaloblastic hyperplasia in the bone marrow.

[It is difficult to follow the author's reasoning in the use of the word "coctic" (=fully mellowed), since this is just what these cells are not.]

The pattern of recovery from the anaemia is as follows. At first there is a sharp rise in reticulocytes which is accompanied by a rapid rise in haemoglobin, the MCH and MCV increase rapidly but the MCHC is stationary. At the fourth week the reticulocytes are still high and the haemoglobin is still rising, the MCV decreases and the MCHC starts rising slowly, but the MCH which has reached the normal level earlier remains stationary. At the end of eight weeks there is still a reticulocytosis (4-10 per cent), the haemoglobin is still submaximal and the MCV is still above normal. At this stage a return to normal values will only follow anthelmintic treatment.

"The removal of hookworms leads to darkening of the skin in patients whose iron deficiency has been corrected. It also causes the disappearance of other kwashiorkor symptoms. The possibility is discussed of inhibition by parasites of tyrosine oxidation being the cause of both the pale skin and, at least partially, the escape of coctic cells into the blood-stream. Tests in which tyrosine is injected into the skin are described to support the first part of this theory."

"It is emphasised that the extermination of parasites will have to be an essential measure in the prevention of kwashiorkor."

The author implies, though he does not actually state, that parasitization is more important than malnutrition in the production of kwashiorkor.

L E Napier

RAPER, A B Sudden Death in Sickle Cell Disease *East African Med J* 1949, Jan, v 26, No 1, 14-22 [23 refs]

While much has been written on the sickle-cell trait in America, until recently, little attention has been directed to it in Africa, and this has been mainly to the clinical aspects. The author reports the autopsies with clinical notes in five cases of sudden death, in which he considers that the sickling was the main cause of death.

(1) A child, aged 1½ years, had a short febrile illness and died suddenly. The vessels of the cerebral cortex and medulla were packed with sickle cells and in the medulla there was perivascular extravasation. There was no evidence of meningitis or polomyelitis. Other organs had their vessels similarly packed with sickle cells and the spleen showed the typical sicklaemic lesions.

(2) A child of 8 years with a history of fever and pain in the chest for 5 days became comatose and died on the third day after admission to hospital. The brain cortex was a bright pink. Histological sections showed the vessels packed with sickle cells but no evidence of encephalitis or meningitis.

(3) A child of one year died after three days fever with diarrhoea and vomiting. The right lower lobe was consolidated but had an unusual appearance unlike that of red hepatization. The brain was not examined but other organs had their vessels packed with sickle cells. The vessels in the alveoli of the lung were similarly packed and there were only scanty polymorphonuclears and macrophages but no organisms in the consolidated parts. [The author considers that death occurred at too early a stage to be attributed to pneumonia alone.]

(4) A man aged 23 died 20 minutes after admission. The brain showed extensive blocking of venules with sickle cells with rupture of the vascular wall and extravasation in places.

(5) A young woman, aged 16 years, died suddenly three hours after a forceps delivery with prolonged anaesthesia. Liver and kidney showed sickle cells distending the venules and there were "sickle haemorrhages" in the spleen.

The author points out that the well-known sickle-cell anaemia is only one result of the sickle-cell trait and that persons in whom the trait is well developed are liable to medical accidents as the result of sudden steady sickling of their cells. The precipitating factor he considers to be generalised anoxaemia from any cause e.g. an acute infection prolonged anaesthesia.

The author discusses the incidence of the sickling trait in Africa especially in Uganda. He concludes that the incidence in and around Kampala is about 20 per cent. in children and 10 per cent. in adults. This discrepancy indicates that a large number of the children with the trait do not live to become adults.

L. E. V. PER

DA SILVA, E. M. Verificação sobre a incidência do sickle-cell anemia em índios brasileiros. I. Índios Parikur, Gabilá, Caripuna, Carvelá, Carnujo. [Study of the Incidence of Sickle-cell Anemia in Brazilian Indians. *Mém. Inst. Oswald Cruz* 1948, Mar. 46, No. 1, 125-34, 10 refs.]

The English summary appended to the paper is as follows:—

Research of sickle-cell anemia in 171 apparently full-blooded Brazilian Indians was negative. These Indians belong to seven different tribes.

"Among 166 individuals of Carnujo (Tuland tribe) 3 were sickle-cell (sickle-cell index 1.67). This tribe is very mixed."

In the table above these results are summarized.

"These observations show that sickle-cell test is a useful tool in anthropological investigations."

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES LII*

Blindness—An analysis of the causes of blindness in West China was made both aetiological and topographically by SHEN¹. A total of 1,130 blind eyes in 748 patients was investigated. In this series of cases, trachoma is the principal cause of blindness in West China and was responsible for 438 blind eyes. Ulcerative keratitis from various causes occupies the next position and was responsible for blindness in 158 eyes. Keratomalacia is prevalent among the poor and was responsible for 90 blind eyes. The majority of the patients were children under 10 years of age. Only 6 patients were adults. Gonorrhoea is another important cause of blindness especially in infants, and was responsible for 100 eyes. Of these, 66 eyes occurred in adults.

Many babies are delivered by untrained midwives and Credé's prophylactic treatment is not carried out in most parts of China.

Syphilis was responsible for 43 blind eyes. Of these, one alone was due to congenital syphilis and the remainder to the acquired form.

Smallpox and hereditary defects are to-day uncommon causes of blindness in West China.

Trachoma—The discovery of the trachoma agent is discussed in a paper by TABORISKY². This paper was sent by the authors to Budapest in 1931 in competition for the trachoma prize, and has not hitherto been published. The reason why he himself has not published this paper sooner is because his conclusions were based upon facts published in previous articles and he awaited their confirmation by other investigators and also that a single link was missing in the chain of proofs of the aetiological significance of Prowazek-Halberstaedter bodies (PHB), namely the culture of these bodies and their successful inoculation to man and monkey.

It has been admitted that the common bacteria met with in trachoma and the Noguchi bacillus are not of any aetiological significance. The author is of opinion that the elements of the inclusions, the initial bodies (i b) and the elementary bodies (e b) are the infectious agents of the disease. These are known as the Prowazek-Halberstaedter's bodies (PHB) and the elements of these are the virus of trachoma. They are also found in blennorrhoea neonatorum and bath conjunctivitis (inclusion conjunctivitis). The similarity of clinical symptoms and pathological peculiarities in trachoma, blennorrhoea neonatorum and bath conjunctivitis obviously indicates a near relationship of their agents. The difference between these three diseases, the author considers, is only one in virulence such as between variola and vaccinia. Blennorrhoea neonatorum and bath conjunctivitis are mild diseases without complications, clearing up even without treatment, while trachoma is a long and severe illness with frequent complications requiring prolonged treatment.

The particles of trachoma virus, the e b, differ from the e b of psittacosis and lymphogranuloma in their size and mode of staining and particularly in their biological properties. Thus a specific organism is found in trachoma which is not to be found in other diseases, according to the first postulate of Henle-Koch. There remains the question whether the PHB are present in all or only in some of the cases of trachoma. The whole course of the disease offers conclusive signs of the close connexion between the inclusions and the clinical symptoms of trachoma. The presence and disappearance of the PHB depends

*For the 51st of this Series see Vol 45 pp 1109-1112

¹ SHEN D S. Investigation of Blindness in West China. A Statistical Review. Chinese Med J. Chengtu Edition 1945 Jan v 63A No 2 62-7 [11 refs]

² TABORISKY J. The Discovery of the Trachoma Agent. Acta Med Orientalia 1948, Apr v 7 No 4, 61-71, 2 figs [Numerous refs]

on (a) the time passed from the beginning of the disease (b) the severity of the disease and (c) the treatment. In medium and severe cases the PIB are always found in the first months of the disease in spite of every treatment. The inclusions disappear when the disease becomes regressive or remains stationary. If the virus becomes active again the inclusions may reappear. As to the third postulate of Henle-Koch namely the growth of elements of PIB in culture and their transmission to man and animals, no positive results have so far been obtained. [See MACCHIARELLO this Bulletin 1948, v 45 111*]

The campaign against trachoma in Morocco is discussed by DELANCO². He came to the conclusion that eye washes and ointments were of little use in treatment and he sought a remedy to attack the actual organism of the disease. He found that the granulations were identical with those found in tuberculosis and akin to those found in leprosy. He has employed local treatment by applying chamomogra oil to the granulations and found even after the first application that improvement was apparent within a week. Pain, photophobia, blepharospasm and inflammation all became less. In the course of time the granulations became smaller and ultimately disappeared.

The treatment is painless, easy to carry out and the cost is trivial.

The author published his first paper on the treatment of trachoma by local applications of chamomogra oil in 1925 [this Bulletin 1928, v 23 920].

A statistical study of trachoma among in-patients is discussed by CHU³ in Chengtu. Of 2,903 patients admitted to the Department of Ophthalmology of the Chengtu Eye Ear Nose and Throat Hospital from January 1940 to December 1943 1,503 patients, i.e. 44.9 per cent., were diagnosed as having trachoma. The sex ratio was 54.6 per cent. females to 45.4 per cent. males. The ages of the patients in 85.1 per cent. of cases ranged between 16 and 40 years of age. The majority of the patient had trachoma stage III (MacCallan) nearly all of the cases showed some sequelae and 31.9 per cent. were classified as blind on admission. The most important factor as a cause of blindness in trachoma, was a lesion of the cornea and so to reduce the incidence of blindness it is essential to control the spread of trachoma.

CHAU⁴ presents a set of figures on trachoma among the in-patient of the same hospital for the year 1939 to 1939. These figures are supplementary to those published by CHI and are analogous. He points out the high incidence of keratitis as well as trichiasis and entropion in trachoma stage III. He further calls attention to the frequent association of entropion or trichiasis with keratitis and that trichiasis or entropion are usually bilateral.

Leprosy—Lagophthalmos in leprosy is discussed by CHATTERJEE and DHARMENDRA. The condition is sometimes seen in leprosy and more frequently in the neural than in the hypomatous type and often leads to complications such as conjunctivitis, keratitis, corneal ulceration, leucoma with pannus, thalmitis and phthisis bulbi. The condition and its complication as well recognized but what is not always appreciated is that they are often preventable by timely treatment.

Lagophthalmos is caused primarily by paralysis of the orbicularis oculi and possibly the deformity is later exaggerated by the unopposed action of the levator palpebrae superioris muscle. In more advanced cases the orbicularis oculi is completely atrophic and the eyelid are fully retracted.

DELANCO	E	Morocco	Letter on trachoma	Morocco	Ann Soc Path Exot	1946
	41	Nov 9	10 677-8			
CHI, Hsin-huang		4 Statistical study of trachoma among in-patients	Chengtu	Chung Hwa	1945	
				673	No 2	73-9 16 pp
CHU		1. A statistical study of trachoma among in-patients	Chengtu	Chung Hwa	1945	
				673	No 2	93-7
CHATTERJEE	S N & DHARMENDRA	Lagophthalmos in Leprosy	Leprosy in India			
1947 Apr		19 No 41	6 749-50 4 p's			

It is usually associated with a leprous lesion on the affected side involving the eyelids and the adjoining skin. In a lepromatous case the lesion is in the form of a diffuse infiltration or nodulation and paralysis is sometimes noticed when the lesions subside. In a neural case the skin may be hypopigmented and flat or red and thick. It may be or may not be anaesthetic but sensation of pain on pin-prick is diminished in all cases.

Lagophthalmos may be present when the patient first attends for treatment or it may occur later during the course of treatment. Lesions on the face and eyelids do not always give rise to lagophthalmos. It may or may not be accompanied by loss of sensation of the conjunctiva and cornea, and the anaesthesia may be found before the lagophthalmos sets in. It is responsible to a certain extent for the associated conjunctivitis and keratitis, since it interferes with the natural defensive mechanism of the eye by allowing foreign irritating particles to remain unnoticed in the tissue. When lagophthalmos supervenes, the defensive mechanism is further interfered with and the result is constant irritation causing conjunctivitis, keratitis and ulceration of the cornea, which may lead to leucoma or panophthalmitis.

The treatment of lagophthalmos consists in prevention as well as cure. Unless there are present signs of reaction, all cases of leprosy with lesions in or around the eyelids should receive preventive treatment on the following lines —

Injections of creosoted hydnocarpus oil should be given around the orbit including the eyelids. The injections are given by the intradermal method once in three weeks. In the interval, weekly injections of the oil are given in other lesions if there be any, or intramuscularly into the buttocks. The injections are continued until the lesion fades and there is partial return of sensation. When the conjunctiva and cornea are anaesthetic, the affected eye should be protected by using tinted goggles and liquid paraffin is frequently dropped into the conjunctival sac to counteract the effects of drying.

The curative treatment of lagophthalmos has to be on the same lines as the preventive treatment but has to be more vigorous. The hydnocarpus oil is better injected subcutaneously. About 1 cc of the oil can be injected in the eyelids once in three weeks at one sitting. The treatment should be continued for some time after the correction of the defect, so that the results obtained may be maintained. Liquid paraffin should be dropped into the eyes frequently and if there be no ulceration the affected eye should be bandaged at night. If ulceration of the cornea occurs, it should be treated with atropine drops or ointment and a pad should be applied. When there is not much discharge, the affected muscles should be massaged daily for about half an hour and the patient should be instructed to move his eyelids frequently.

With this treatment lachrymation diminishes and there is a gradual return of power to the affected muscles within three months. In advanced cases the surgical treatment of lateral tarsorrhaphy or canthorrhaphy should be combined with medical measures.

A report of leprosy lesions of the fundus in a case of lepromatous leprosy of fifteen years duration is discussed by ELLIOTT⁷. The patient, a corpulent white male, 43 years of age, reported to the eye clinic complaining of sudden loss of vision in the left eye. He had been reading when he became aware of this difficulty and when seen two hours later had no other symptoms except slight discomfort. Upon examination there was slight circumcorneal injection. The pupils were active. The fundus presented an array of creamy white, waxy-surfaced, pedunculated "pearls", projecting from the retina and situated

⁷ ELLIOTT, D. C. A Report of Leprosy Lesions of the Fundus. *Internal J Leprosy* 1948, July-Sept. v. 16 No 3 347-50, 1 fig.

from one to two disc diameters from the optic disc. In all there were two such lesions and they were identical ophthalmoscopically with those seen at the iris in this patient and in others. Iris lesions of this kind have been histologically proven to be true lepromas and contain typical lepra cells, Hansen bacilli and round-cell infiltrations. In this patient lepromata of the iris were present in each eye but the retinal lesions were found only in the left eye. During observation it was found that these iris and retinal lepromata were transient formations developing and receding within a period of eight months duration.

This was the only case of a retinal leprous lesion in the examination of over 500 fundi.

In an addendum the author states that since this article was written three other cases of leprous lesions of the fundus of the eye have been demonstrated.

Vitamin B deficiency.—The article by DAWSON FOXLEY & WARD (this Bulletin 1949 v. 46, 278) on vitamin B complex deficiency states in West Africa is discussed by Fitzgerald Moore*. He points out that the dietaries of the Gold Coast, Sierra Leone and Southern Nigeria differ markedly in the staple foodstuffs and, as would be expected, in the expression and symptomatology of deficiency disease. Again only certain sections of the peoples show manifest evidence of these conditions and the severity of them is primarily determined by economic circumstances. Generally speaking the Gold Coast is much less affected with frank nutritional disease than is either Sierra Leone or Southern Nigeria. Though kwashiorkor is more common in the Gold Coast, neither the very extensive dietary and clinical survey of PERCIVAL POPE of BEATRICE RUSSELL have recorded any real incidents of nutritional retrolbulbar neuritis there in great contrast to these other two colonies.

Nutritional retrolbulbar neuritis (followed by partial optic atrophy) can occur independently of either beriberi or arboflavinosis or along with these diseases and the signs of these two latter will rapidly disappear with the return to a normal diet but not so the central neuritic condition. In Southern Nigeria beriberi is a practically unknown even recorded disease. Arboflavinosis was extensively common among the manioc eaters and associated with it, nutritional retrolbulbar neuritis (in the active phase). Arboflavinosis was however not seen among the yam eaters who only used manioc—a secondary staple foodstuff. The degree of arboflavinosis varied considerably and in Nigeria was not as severe as among the rice-eating population of Sierra Leone. For example, frank keratitis was rarely seen in Nigeria, but was exceedingly common among the Sierra Leone sailors and Luo boys. The incidence of nutritional retrolbulbar neuritis in relation to arboflavinosis varied considerably. The highest rate found by the author was 1 per cent. By contrast a high percentage of pregnant women attending the ante-natal clinic in Lagos showed arboflavinosis but it was rare to find nutritional retrolbulbar neuritis.

H. H. SCOTT showed in the central neuritis of Jamaica that beriberi was not present in those cases. WRIGHT described the A and B avitaminosis of Sierra Leone and considered that the condition was apart from beriberi. Likewise the work of STANFORD and many others does not support beriberi as a cause of retrolbulbar neuritis. Thiamin was found of little value in nutritional retrolbulbar neuritis in prisoners of war camps, both in its failure to cure and to prevent the condition. The author in Nigeria was successful with autoclaved marmite which was as efficient as ordinary marmite always provided the cases were seen early enough. The aetiology of nutritional retrolbulbar neuritis both as regards the exact curative or preventative factor or factors is still not known. It is possible the cobalt-containing vitamin B₁₂ which according to

SPIES, possesses a powerful antineuritic effect, may provide the solution. It is also possible it may not be a vitamin at all, but that "something else" in marmite and yeast and still unidentified.

Thelaziasis—*Thelazia* infestation of the conjunctival sac in China is reviewed by LIANG⁹. He gives the history of four cases reported by others and describes a fifth case seen by him. All the cases were caused by *Thelazia callipaeda*. Animals infested with *Thelazia* are known to be widespread in China and the worm may involve the eyes of mammals and birds. *Thelaziasis*, as do other parasitic diseases, produces an eosinophilia in the blood. When present in the conjunctival sac it produces symptoms of foreign body irritation, intense pain and lachrymation and causes verminous conjunctivitis. The cornea may become cloudy as a result of irritation by the worms. Occasionally there may be no subjective symptoms in the infected eye, the parasites being discovered during the routine examination.

E O'G Kirwan

HEAT STROKE AND ALLIED CONDITIONS

MOV, A. M. El empleo de la protección antisolar y de los repelentes de insectos en los indígenas latinoamericanos [The Use of Insect Repellents and Anti-sunburn Substances among the Latin-Americans] *Rev Argentina de Dermatosisifilologia* 1948, July-Dec, v 32, Nos 3/4, 303-6 [35 refs]

Hernandez is quoted as having mentioned, nearly 380 years ago, that the Mexican Indians used an aromatic resin, believed to have been *Liquidambar styraciflua*, as a protective ointment. Substances in later use have been obtained from *Bixa orellana* and having many synonyms according to locality (more than a dozen are mentioned), one of these is *urucu*, and the medical term for anointing the body with the red juice is *urucuzation*.

An analysis of the seed of *Bixa orellana* by Chevreuil in 1833 showed it to contain a water-soluble yellowish colouring matter, *orellina*, and a red substance, *bixine*, soluble in oils. It is the latter which is used as an ointment with a fatty basis, either animal as capibara, iguana, or fish oil, or vegetable as palm oil. It is used as a protective from the sun's rays and also as a repellent of insects, especially mosquitoes. Being insoluble in water it is not affected by sweat. The women anoint the men with it before the latter go to work in the sun, or to hunt or fish, and "they return from fishing in a canoe with their backs covered with dead mosquitoes". The seeds are also used medicinally as a laxative and as a condiment with rice.

The experiment was made of exposing three thermometers to the sun, one had the bulb silvered, another was covered with *urucu*, the third had the bulb blackened. The first gave a reading of 32°C, the second 33°C, the third 40°C. *Urucu* therefore protects against the sun's action, both the heat and the actinic rays, but does not prevent the evaporation of sweat.

In drier and colder regions where *Bixa orellana* does not grow, or grows only with difficulty, infusions of the bark of certain trees of the *Simarubia*, *Simaba* and *Picrasina* genera are used as repellents.

H Harold Scott

⁹ LIANG S C. *Thelaziasis of the Conjunctiva*. *Chinese Med J* Chengtu Edition 1945, Jan, 1, 631 No 2, 70-72.

days the first second third and fourth stage larva required respectively 5.7-6.2 days, 4.3-4.4 days, 5.3 days, and 9.0 to 9.4 days. A slightly better survival rate for the *fipiens* larvae was not found to be statistically significant. [No observations for pupae are given at this temperature.] Emergence from pupae occurred at 18.1°C. in both species and, at this temperature both were fed on pigeon within three days and laid fertile egg rafts nine to twelve days later. It is concluded that at low temperatures no appreciable differences were observed between these strains of *C. fipiens* and *C. quinquefasciatus* as regards survival and the rate of development of the aquatic stages nor in the feeding and mating habits of the adults.

Five-minute exposures of the aquatic stages of all four populations to high temperatures showed that the lethal temperatures for 50 per cent. kills varied only within the narrow ranges of 42.1 to 43.0°C. (for eggs) 41.3 to 42.3°C. (larval stages) and 41-42°C. (pupae). The duration of the various stages bred at high temperatures (31-34°C.) were as follows: 23-24 hours for the eggs, 1 day for each of the first three larval instars, 3-4 days for the fourth instar larva and 24 hours for the pupae. Eggs hatched at 33°C. but not at 34.5°C. There were no appreciable differences in the survival rates of these various stages and 16.5 per cent. of *C. fipiens* and 17.7 per cent. of *C. quinquefasciatus* matured to adults. Adult activity at 31.5°C., 32°C. and a relative humidity of 93 per cent. was studied for *C. fipiens* (Michigan), *C. quinquefasciatus* (Alabama) and the southern form of *quinquefasciatus* from Texas. Females of all three populations fed on pigeon but only the Texas form of *C. quinquefasciatus* produced seven completely fertile egg rafts, the other strains producing four out of five (*fipiens*) and seven out of eight (*quinquefasciatus*) infertile rafts. The fertility of the raft increased, however, when both these strains which still included males were transferred to room temperatures (temperature not stated but presumably moderate) the conclusion being drawn that at the high temperature mating had not occurred with normal success. It is concluded that apart from this indication that the Texas population of *C. quinquefasciatus* mates more readily than *C. quinquefasciatus* from Alabama and *C. fipiens*, no appreciable differences were observed at high temperatures between *C. fipiens* and *C. quinquefasciatus*.

All four populations paired on the wing, mated in 5 in. scale cages, and were autogamous, requiring blood meals for the production of fertile eggs.

Cross-matings between all four populations resulted in fertile progeny, and in the case of both types of pairing of *C. fipiens* (from Michigan) and *C. quinquefasciatus* (from Alabama) the hybrid stock was bred to the egg of the F_2 generation. All other crosses were maintained as far as the eggs of the F_2 generation. Sterile rafts were rare.

The author gives reasons for suggesting that the absence of *C. quinquefasciatus* in the north is due to its inability to hibernate or to withstand more than about a hundred days of North Carolina winter conditions, possibly a reluctance to mate at low temperatures also plays a part in limiting its northern distribution. Hibernation enables *C. fipiens* to survive the colder northern climate and its absence in the south may, it is suggested, be due to its inability to mate satisfactorily at high temperatures.

It is observed that in nature transitional forms between *C. fipiens* L. and *C. quinquefasciatus* Say have been reported by many workers and, in view of this, and of the results obtained in cross-breeding the four populations dealt with in the present study, it is suggested that the differences between the species are no more than intra-specific. The following nomenclature is therefore proposed: *C. fipiens fipiens* L. 158 from Michigan and Baltimore, *C. fipiens quinquefasciatus* Say 1822 for the *C. quinquefasciatus* population from Texas, the *quinquefasciatus* population from Alabama occupies an

ticks fed under a variety of conditions. They show that for a very wide range of values a linear relationship between the logarithm of the blood area-concentration and the mean reciprocal survival time of the ticks has been demonstrated. This was not altered by treatment of the rabbits with B.A.L.

P. A. B. 124

STIRRELL W. J. LARCKSON W. M. MATSUDA K. PICKARD H. B. SORBY L. & TUCKERMAN W. B. Physical Properties of some Organic Insect Repellents. *J. Amer. Chem. Soc.* 1949 71 No. 2, 507-8.

See also p. 671. MOY El empleo de la protección antisolar y de los repelentes de insectos en los indigenas latinoamericanos.

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. Report on the Water Resources of the Bechuanaland Protectorate, Northern Rhodesia, the Nyasaland Protectorate, Tanganyika Territory Kenya and the Uganda Protectorate (DRAKSHAM F). Colonial Research Publications (No. 7). 85 pp., 3 diagrams, 14 maps (4 folio) 3 graphs & 24 figs. on 8 pls. 1948. London. H.M. Stationery Office [10s. 6d.]

The scarcity of water throughout a great part of East and Central Africa is a matter of every-day knowledge. The astonishing feature of it is that by the standards of many other parts of the world the actual rainfall is quite adequate and countries with no greater precipitation support dense flourishing populations, whereas in these parts of Africa populations are restricted. The difference lies partially but not very greatly in an unfavourable annual distribution of rain in Africa, and very much more in a wasteful use of the land over centuries which has led to soil erosion, a quick run-off in the rain, and general aridity very soon after them. Ignorance of how to conserve water or even how to tap natural sources is a contributory factor to such an extent that Gillman in his survey of population distribution declared that the presence or absence of a permanent domestic water supply within the reach of primitive tools and skill determines the pattern of population.

Improvement in the availability and use of water are more likely to benefit the African than almost any other measure and they are of direct medical and demographic interest. The author has surveyed the resources and made a series of recommendations of which the most important is the promotion of small schemes of conservation on a village scale by such measures as the impounding of headwaters, the construction of wells, improvement of dams (a form of swamp) and modification of springs giving detailed examples of their working. He is to some extent concerned at the risk of increasing the prevalence of disease particularly malaria, hookworm and balharzia. The reviewer is naturally anxious that this should not happen but as he sees the problem the usual alternatives are not healthy or unhealthy people but poor or no people, the new communities to be created by the measures now advised would not in any case start on a worse basis than those that now exist and steps could readily be taken to improve their lot.

In the standard scheme for a village of 100 persons with 100 head of stock, the author considers that a daily supply of 1,500 gallons would be adequate and that it could best be secured from a catchment area of 200 acres collected in a small reservoir which would be controlled by a dam 70 feet long, 50 feet broad, 5 feet average and 12 feet maximum depth. This would be protected from direct access and the water would be led through piping and channels to an appropriate water point. The reviewer's reaction is that this is in

reality demanding very efficient conservation as such a community might often have little more than 300 or 400 acres at its disposal, and he would therefore like to have seen less emphasis in the report on the possibility of using makeshift piping and conduits which could only cause great wastage. For evidence that the scheme is in fact practicable in its broad outlines one can turn to the ancient irrigation works of Ceylon, some of which are now being revived, which by a great multiplication of works of this sort supported more people than do the countries now surveyed, despite the fact that the rainfall was about the same and the land available one fortieth of that now considered.]

G Macdonald

SAUNDERS, I G. A Survey of Helminth and Protozoan Incidence in Man and Dogs at Fort Chipewyan, Alberta. *J Parasitology* 1949, Feb., v 35, No 1, 31-4

Fort Chipewyan is at the west end of Lake Athabasca, about 370 miles north of Edmonton, Alberta

In the course of other investigations there during the summer of 1945, the author found evidence of human tapeworm infection and accordingly examined stools from as many persons as possible who had lived at least a year in the north. For practical reasons, most of those examined were children at the Mission School

In all, 140 persons were examined by direct examination of a simple smear. The results included 4 specimens positive for *Entamoeba histolytica*, 10 for *Iodamoeba bütschlii*, and 19 *Giardia intestinalis*. No *Taenia* infections were found, nor were trematodes or *Ascaris*. No diagnostic facilities for *Enterobius* were available, though histories of many persons suggested its presence.

The only helminthic infection positively identified was *Diphyllobothrium latum*. Ova were present in 16 of the 140 persons. Symptoms were few and vague and most of the infected persons were apparently unaware of their infection. No anaemia attributable to fish tapeworm was encountered. Eight persons were treated with castor oil and male fern, without evidence of toxicity.

The author discusses the factors affecting the incidence of *D. latum* infection in this area. "The people are essentially nomadic, with 'makeshift cooking conditions'. This factor would not apply in the case of the children in the Mission School. It was possible to examine only 16 of the persons known to lead the nomadic life and 11 of these were positive for *D. latum*. Indifference and suspicion made it difficult to obtain specimens from these people and even in the willing persons constipation, which is common, added a further complication.

The distribution of *D. latum* further north is discussed and from local information the author has reason to believe that the infection is "probably distributed all through the vast north country."

It is also noted that 38 of 88 dogs examined harboured *D. latum*, but usually only a few ova were found. *Ancylostoma caninum* was found in 10 dogs and a cyst of *Isospora* (probably *bigena*) in one.

[In connexion with the finding of *E. histolytica* in 4 human cases, the author writes: "Having no concentration or staining checks on the direct iodine smear observations, the author reports with some hesitancy the incidence of *E. histolytica* so much farther north than any previous records. It was a small-cyst race encountered occasionally in Saskatoon (Miller 1939), non-pathogenic, and was in Indians and half-breeds, not whites who might have been infected outside"]

H J O'D Burke-Gaffney

BOOK REVIEWS

MATRAXO Flávio & others. *Tratado de Leprologia*. [Treatise of Leprology. Vol. 1. História da lepra no Brasil e sua distribuição geográfica [MATRAXO F.] 208 pp., ill. Vol. 2. Etiopatogenia e anatomia patológica [ROTHBERG A. & BECHELLI L. M.] 451 pp., ill. Vol. 3. Diagnósticos [DE SOUZA LIMA L. & DE SOUZA CAMPOS V.] 168 pp. ill. Vol. 4. Clínica e terapêutica [BECHELLI L. M. ROTHBERG A. & MATRAXO F.] 368 pp., ill. Vol. 5. Epidemiologia e profilaxia [DE SOUZA CAMPOS V. BECHELLI L. M. & ROTHBERG A.] 397 pp. ill. 1944. Rio de Janeiro. Serviço Nacional de Lepra.

Several monographs on aspects of leprosy written by well-known leprologists, have been issued by the Brazilian Health authorities. Now at the instigation of the National Leprosy Service under the Director Dr Ernani Aguiar, these writers have combined to produce a Treatise on Leprosy. This treatise consists of 5 volumes bound in two. 1. History of Leprosy in Brazil and its geographical distribution. The latter is dealt with again and more fully in Vol. 5. 2. Aetiology and Pathology. 3. Diagnosis. 4. Clinical description and Treatment. 5. Epidemiology and Prophylaxis.

Though published as long ago as 1944 this work must still be the most comprehensive in existence on this disease. The lack of comprehensive works in Portuguese and the difficulty of acquiring papers and books published abroad led, says the writer of the preface, to the preparation of the monographs referred to above but in 1942 the decision was reached to combine in the form of a treatise the various articles for the information of medical men engaged with leprosy and its prophylaxis in all States of the Federation. So in 1943 the National Leprosy Service was instigated to prepare four more sections (one on *Diagnosis of clinical laboratory and biological* has already been issued in 1944) and to produce them complete in the form of a Treatise.

The work, though dealing primarily with conditions in Brazil, will be of enormous value to workers in any country where leprosy is rife. Thanks are due therefore to the Public Health Service of the Ministry of Education and Health in Brazil under the Minister Dr Gustavo Campana and to the Institute of Inter American relations of the United States. In the space of our disposal we can do little more than indicate the scope of this large work of nearly 1 000 pages.

Volume I *History and Geographical Distribution* is divided into 4 parts. Part I gives an account of the history of the disease and comprises three chapters. The first discusses the origin of leprosy in Brazil and states that it was not indigenous but was introduced by slaves from Africa and by the Portuguese from Europe. The second tells of the social and economic factors which caused the infection to spread over the country especially by agency of the leprosy in the third the extension is described in more detail in each of the 22 constituent States of the Federation—a very interesting chapter tracing the increase from earliest times down to 1943. Part II also contains 3 chapters one on the study of the disease in Brazil, started by Gomes in 1788. The second is a review of the epidemiology, treatment, the clinical aspect and pathology—merely a long list of names and dates. The third contains a short account of the spas reputed to be beneficial in treatment and of vaunted charlatan remedies. Part III speaks of the habits and social customs of patients, mendicants, their isolation, hospitalization, segregation and the ban against them. Part IV deals first with official measures put into force in the colonial period, 17th to 18th centuries then in imperial times to the present with references to philanthropic and religious societies concerned with sufferers from leprosy. Following this is a sketch of scientific measures in the anti-leprosy campaign in the various

States and the co-operation between the State authorities and Societies for combating the disease. There is an appendix to this chapter, of documents of historical interest.

Volume I is interesting but is, naturally, not so full and detailed as Professor de Souza-Araujo's large and comprehensive work on the *History of Leprosy in Brazil*, two volumes of which have already appeared and have been reviewed in this *Bulletin* [1947, v 44, 760, 1948, v 45, 1132].

Volume II, on *Aetiology and Pathogeny*, describes in 11 chapters the organism, its characters, the attempts at cultivation (this section is well illustrated), the relations between human and rat leprosy, the results of inoculation into rats, buffaloes, birds, opossum, cattle, sheep and horses, the possible hereditary or congenital transmission, the mode of penetration in man and its spread after gaining entrance, immunity and allergy, the lepromin reaction and the reactions to syphilitic antigen and to other acid-fast cultures, and the Witebsky-Klingenstein and Rubino reactions. Finally, accessory factors are considered, such as age, sex, nutrition, climate, other diseases and individual and racial predisposition. [Unless the editing of a large work such as this is very carefully done there is a danger of overlapping and repetition, and this last section is discussed again in the final volume of this treatise.]

The section on *Histopathology* comprises six chapters and is embellished with fine reproductions of photomicrographs of the tissue changes set up and in it are discussed the relations between the pathology and the clinical manifestations, the factors determining the mode of evolution and the course towards cure or death.

Volume III, on *Diagnosis*, is of the highest importance. The subject is treated from several aspects: (i) Clinical, the physical examination and the results of the histamine and pilocarpine tests; (ii) Bacteriological, the search for the organism in the nasal mucus, the skin lesions, the glands, the peripheral blood by thick drop and the Crow and the Rivas methods, the nerves and the secretions or excretions; (iii) Serological, the reactions of Rubino, Gomes, Lleras Acosta, Witebsky and others; (iv) Histological and Immunological, Mitsuda, Bargher, etc. Diagnosis of nervous leprosy is gone into in more detail and the differential diagnosis from syphilis, pityriasis, vitiligo, forms of eczema, various erythematous and achromic dermatoses. Tuberculoid and lepromatous types are similarly discussed. This section is well illustrated, some of the reactions being reproduced in colour.

Volume IV comprises two parts: 1 *Clinical*, 2 *Therapeutic*. The former is a splendid effort well carried out. All forms and aspects of the disease are described and depicted with excellent photographs, many coloured plates and with abundant references. Coloured plates showing the development of lesions of the nasal septum are remarkably good. The treatment section occupies less space as is but natural since there is not very much to say on this subject. The treatment proper is prefaced by general remarks on appraising the results and warning against too ready acceptance of the *post ergo propter*, because good hygiene will bring benefit and the disease presents at times spontaneous remissions so that amelioration after a certain treatment is not proof that the one is due to the other and the crucial test consists in observation of control cases equal in number and stage and under similar conditions, untreated. Mention is made of treatment by improved general hygiene, by good food and properly balanced diet. Modes of treatment now little used are referred to: iodides, arsenicals, mercury, copper and gold salts, sera, vaccines, vitamins, sulphonamide drugs, diphtheria toxoid and antitoxin, carbonic acid snow, methylene blue, eosin and other dyes, phenol, thymol, guaiacol and several more. Lastly, in greater detail, chaulmoogra, the oil, the ethyl esters and fatty

acids. This book was published in 1944 (but received here only in 1949) and although Promin is mentioned, the remarkable results achieved in treatment by the Sulphonas since that time are of course not mentioned. Special short chapters deal with treatment of the leprosy reaction and the many drugs which have been tried for it—of perforating and other forms of ulcer and the pain of the disease. The last few pages of this volume are given up to consideration of the part played by physiotherapy, mechanotherapy and hydrotherapy including galvanism, high frequency diathermy, U.V. rays, balneotherapy, massage, physical exercises and gymnastics.

Volume I deal with *Epidemiology and Prevention*. Under the former heading are considered biological and social factors, climate, war, migration. The distribution and figures of prevalence based on censuses made in 1940 onwards and analyses of earlier records are given for the different States of Brazil, for South, Central and North America, Canada, the European nation, Asia and the Far East, Oceania, East, West and Central Africa, Egypt and the Sudan. Tables are presented to show the same more graphically. Other factors already referred to in Volume II, such as sex, age, occupation, race, climate, nutrition, general hygiene and sanitation, intercurrent disease, spread of infection in the family and factors favouring dissemination are all in turn debated, though some only briefly.

Lastly, Prophylaxis in antiquity and in more recent times—periodic examination of contacts and associates, isolation, hospitalization, asylums, colonies, sanatoria, domiciliary segregation, rules for discharge, dispensaries for ambulant and probation patients, propaganda and educational measures, organization of a leprosy service, all come under discussion ending with an account of the National Leprosy Service of Brazil and what it has succeeded in accomplishing and at what cost in each of the constituent States, the laws at present in force and additional laws proposed for adoption in the future.

The Minister of Health, the National Leprosy Service, the Editor and the contributing authors are all to be most heartily congratulated on accomplishing their huge task and producing a work which must surely be a standard of basic information for many years to come. Nor must we forget the producers and publishers. The whole set-up of the work is high class. The print is clear and easy to read, the paper of a quality we have not seen for a long time in our own country and the binding is neat and adequate. This work and Professor de Souza Araújo's *História* will amply furnish all that anyone need know of leprosy.

II Harold Scott

AGRICOLA, Ernani. Director do Serviço Nacional de Lepra. Campanha nacional contra a lepra. Nacional Campaign against Leprosy. Palestra proferida ao microfone da PRA do Serviço de Radiodifusão Educativa do Ministério da Educação e Saúde 7 de 1944 a 16 de 1945. 181 pp. 1944. Rio de Janeiro. Serviço Nacional de Lepra.

During the nine months—November 1944 and August 1945—Dr. Ernani Agrícola was directed by the Ministry of Education and Health of Brazil to deliver broadcast, almost every week, telling the people about leprosy and what was being done to deal with it in their own country. Thinking that these talks might be interesting and useful to a wider circle, the author has now collected them together and revised them in a small book. From the point of view of the man in the street inclusion, in this term, the intelligent layman, these broadcasts would doubtless accomplish what they purport to do, for they are expressed in simple, straightforward language, avoiding the use of technical terms.

They tell a little of the history of the disease in Brazil [among the authorities and authors mentioned we have failed to find the name of Professor de Souza-Araujo, probably the greatest authority in Brazil on this disease], and the following points are taken and spoken of in turn. Remarks on the epidemiology of leprosy and parallels between Brazil and other countries, such as India, Japan and the Philippines, the numbers of the afflicted, the numbers in special establishments and the types of these establishments, agricultural, asylums and hospital colonies. Several of these are referred to from time to time and the costs of their upkeep. Reasons are given for isolation and segregation and reference is made to various committees and societies for the relief of patients and their families, also to the methods for dealing with the children, for finding out concealed cases, for careful vigilance of patients to be discharged or kept under observation, for education of the people, propaganda and distribution of literature.

The broadcasts seem admirably adapted to their original purpose but, naturally, the detailed information is only of local interest and would not appeal in places outside Brazil.

H Harold Scott

DE SOUZA CAMPOS Nelson & BECHELLI, Luiz Marino. *Sintomatologia nervosa da lepra* [Symptomatology of the Nervous System in Leprosy] 193 pp., numerous figs on pls. Ministerio da Educação e Saúde, Departamento Nacional de Saúde, Serviço Nacional de Lepra. 1946. Rio de Janeiro. Imprensa Nacional.

This is another of the series of excellent monographs dealing with different aspects of leprosy and issued by the Leprosy Section of the National Health Service of Brazil. This one deals with the nervous manifestations, the tests therefor and the general and differential diagnosis.

The thesis is divided into two main parts. In Part I are described and discussed in sequence the sensory changes, the motor disturbances and the trophic and vasomotor symptoms. In Part II, the clinical tests, the examination of patients, the actual condition and evolution of the nervous manifestations, the differential diagnosis and a summary or epitome of the neurological lesions and their classification. Apart from numerous footnotes in the text, there is appended a bibliography of more than 150 references. The statements made, it will be seen, are well documented. There are very clear diagrams shaded to show the distribution of lesions in certain patients and other very detailed, but clearly reproduced figures to indicate the innervation of the muscles of the body and the roots from which the peripheral nerves arise, and another similar diagram of the cutaneous nerve supply. Photomicrographs demonstrate the histopathology of biopsy specimens of nerves and skin and, lastly, there are 59 photographs direct and X-ray to show the deformities and mutilations of the hands and feet and the bony changes produced by this disease.

To return to the letterpress. The methods of testing for the nervous symptoms are first detailed, the distribution of the anesthesia and paraesthesias. This section is followed by a description of the motor disturbances in arms, legs and face and thus by a consideration of trophic changes in skin, subcutaneous tissues, muscles and bones and the mutilations resulting from absorption, dry gangrene and ulceration. In Part II the clinical and laboratory examinations are discussed in greater detail, the histamine, pilocarpine and pricking tests and the methods of carrying them out. Laboratory tests include examination for bacteria, the Mitsuda reaction and biopsy. Succeeding this chapter on methods comes a section on the various clinical signs and symptoms, the

GUJIA MORALES E. (Catedrático de medicina legal Médico-director del Hospital Psiquiátrico Provincial de Cádiz) *Psicosis palúdicas y atebínicas. Trastornos psíquicos en el paludismo espontáneo, en el terapéutico y en los tratamientos con preparados atebínicos.* [Psychic Disturbances in Malaria: Spontaneous and Therapeutic, and in Treatment with Preparations Atebrin.] pp. ix+173 3 charts. Colección de Monografía de Investigación Médica. 1945 Barcelona J. M. Masó.

This is one of a series of medical monographs by Spanish authors of reputation, edited by J. M. Masó of Barcelona. In the present instance the author's first idea was to deal with the last only of the matters mentioned in the title, as he had seen several cases among patients treated with atebin (mepracrine), but later it was deemed advisable to enlarge the scope to include similar disturbances occurring in ordinary untreated malaria subjects and in patients undergoing therapeutic malaria treatment.

The study was begun in Cáceres where malaria is endemic, and continued in Cádiz. Before undertaking a description of malarial psychoses the author thought it would be wise to give a brief account of common psychoses which he designates "symptomatic psychoses" apart from the malarial form. The whole work is therefore divided into four chapters: 1. Symptomatic psychoses as met with in everyday clinical psychiatry. 2. Psychic disturbances in malaria "spontaneous malaria" as the author calls it. 3. Psychic disturbances occurring in patients undergoing therapeutic malarial treatment. 4. Psychic disturbances among patients treated by atebin preparations.

In chapter I he gives a brief account of psychic disorders which he subdivides into two main groups: those primarily cerebral or organic and those with functional toxic effects on the central nervous system. Under the latter are included disorders due to poisons *ab extra* as alcohol, morphine and lead and those occasioned by disease such as infections, endocrine disturbances, etc. It is to the latter that the author restricts the term symptomatic psychoses [Not a very satisfying classification, because "organic" causes will interfere with normal function, and, on the other hand, toxic effects may not be purely functional but may lead to definite lesion. In this connection the author refers to such conditions as hebeticity, mental confusion, anxiety, outburst of anger and of threat, of delirium, incoherence, mental perplexity, stupor, depression and hallucinations: after the fever has subsided there may be post febrile psychoses as emotional upsets, irritability, emotional hyperaesthesia, depression and hypochondria, impairment, perhaps loss, of memory.]

The malarial psychoses, chapter II, come to the notice of clinicians and malarialogists more often than that of psychiatrists. They are usually abrupt in onset and are seen as confusional states, patchy forgetfulness, exhaustion, hallucination, perhaps coma, or sudden mania, melancholia, hysteria's symptom: these usually accompany the febrile stage. In chronic malaria we see cases of depression and melancholia or apathy and indifference. Paranoia is not uncommon, especially, as is the author in tropical countries. It is not easy to differentiate organic malarial encephalopathy from psychoses not due to actual cerebral lesion. Perhaps there is no real distinction and the latter—extra-nervous psychoses—may be associated with cerebral lesion, not yet discovered. The symptoms may be due to vascular embolism or thrombosis, to punctiform haemorrhages with sudden loss of consciousness and, especially in children, with convulsions. Other conditions have been reported such as monoplegia, trismus, Parkinsonism, chorea, amnesia, epileptic attack and bulbar symptoms.

The author concludes that he can distinguish 7 clinical types: 1. That caused by malarial encephalopathy. 2. Symptomatic malarial psychoses due to the

physical action of the infection on the central nervous system 3 Symptomatic malarial psychosis proper 4 Endogenous psychosis in the course of a malarial attack 5 Abnormal psychic reaction provoked by the infection 6 Psychic symptoms attributed to malaria, but feigned by the patient as an interested person 7 Psychic disturbances of a non-malarial nature, but coinciding with a malarial infection [To the reviewer these seem somewhat artificial and not easily differentiated, with exception of type 6]

Therapeutic malaria, chapter III, has afforded an opportunity for observing certain types of psychosis produced by the action of malaria on different personalities, in particular general paralytics These cannot be ascribed solely to the malaria because some of them at least may be observed in patients with general paralysis treated with other pyrogenics, or even drugs such as neosalvarsan The following are specially referred to in this chapter

1 Paranoias with hallucinations (the so-called Gerstmann psychosis), or the schizophrenic The hallucinations are most commonly auditory, next visual or tactile, more rarely of taste or smell They are seen oftenest in the last days of the induced fever, or after treatment of the malaria, and it may be some time after Records show that 5-18 per cent of patients exhibit this form The case is quoted of a man of 45 years who at each access of fever became very excited, attempted to tear his clothes and to hurl himself through the window, would break every thermometer he used and, in the apyretic intervals, had auditory and visual hallucinations Under treatment by quinine the psychosis disappeared ten days after the temperature became normal

2 Suicidal tendencies The author differentiates those who attempt, and even commit, suicide owing to depression from their disease, before, during, or after treatment by malaria, and those who do so in the stage of depression after the course of malaria

3 Cases in which the patient does not react in the usual way to the malarial infection One case is recorded where the patient developed fever of a typhoid character after inoculation with the subtertian parasite and died in 10 days, in another patient general depression, a rapid pulse, diarrhoea and uraemic symptoms necessitated stopping the treatment at the third access of fever

4 Decline of the general paralysis symptoms, reversible or not, with psychosis One patient after the 6th access of fever stayed motionless, neither speaking nor appearing to understand anything, with uncontrolled sphincters, he had to be fed by tube The treatment was stopped at the 10th access of fever Six days later he had troublesome visual hallucinations, on the 10th he regained control of his sphincters, but convalescence was prolonged for two months

5 Epilepsy following malarial therapy

Chapter IV quotes reports of many cases of psychosis in the course of treatment of malaria by atabrin and repeats Kingsbury's explanation that the atabrin, by destroying the parasites more rapidly than does quinine, liberates a flood of toxin which causes the symptoms, or the atabrin has a direct toxic effect on the central nervous system

The author sent a questionnaire to the doctors of Cáceres and Cadiz, asking them how many malaria patients they had had in the preceding five years, how many had been treated with atabrin (or atepé), in how many of these they had observed psychic symptoms, and to give details He then quotes cases one with a manic-depressive state, another with sudden delirium, incoherence and insomnia (but several members of this man's family—uncle, father and sister—exhibited symptomatic psychosis), another had vomiting

and diarrhoea and complained that she was being poisoned and her food was bad, and at other times appeared perplexed and constantly asked what was happening. These symptoms did not occur when quinine was given, but only after atabrin. Other similar cases are noted.

The author then made some experiments administering atabrin to both persons to see if psychoses were set up in any of them. He gave each 5-8 tablets of atabrin (or atepel) daily for a week but though signs of intolerance such as vomiting might be seen none showed any psychosis. He then gave the drug intramuscularly the contents of an ampoule of 0.3 gm. of the hydrochloride. One subject on the fourth day became confused, kept looking under his bed to see if anyone was hiding there and on leaving his room seemed unable to recognise it on his return and went into others or he would remain motionless and mute or repeatedly say "Pardon me pardon me" say it again. This condition persisted for 16 days. The author concludes that atabrin can cause psychosis in man. This however was the only one among several who received the atabrin inoculation and the inference is drawn that there must be some susceptibility or tendency to psychosis also playing a part.

Analysing 34 cases the author finds that as regards

1. *Sex*—Nineteen were males, 15 were females—a difference of no moment.
2. *Age*—Twenty-one were between 9 and 43 years (years of puberty and adolescence) two only between 41 and 49 years. 8 were in the 51st decade and there was only one over 59 years (this totals 32).

3. *Others in family*—Eighteen gave a history of "psychic pathology" in close relations parents, uncles, cousins.

4. *Dosage of atabrin* which preceded the psychosis. Thirteen had the usual dose of 3.7 (3 tablets daily for 7 days). 13 others had less than this, 2.1 to 3.0. 7 had higher doses from 13.1 to 37.5.

5. *Stage of treatment when the psychosis was observed*—Thirteen showed symptoms during the course while in 20 the course was completed, or they were given a larger dose. In 11 of the 13 symptoms appeared after the ordinary dose of 3.7 with an interval up to 49 hours. In the other two the interval was longer 9 and 18 days.

6. *Course and termination of atabrin psychosis*—The commonest early symptom was mania with confusion and when this is all the prognosis is good, as the symptoms clear in a few days except for some restlessness and insomnia. Those with other complications clear up more slowly but all the other patients recovered in time without any residual psychotic change. In four only were the symptoms prolonged over a month in 27 there lasted from a few hours to one month.

Summing up the author states that atabrin psychosis occurs in 5 per thousand cases. In making a diagnosis it is far from easy to exclude endogenous psychosis and abnormal psychic reaction. With psychosis in untreated malaria we find parasites in the blood, whereas in atabrin psychosis we should not. On the other hand this is not all for a malarial psychosis may persist after the infection has been eradicated.

The subject bristles with difficulties and the distinction between ordinary psychoses and those due to malaria or to atabrin is not so easy in practice as it may be made to appear on paper. The author is however to be congratulated on the accomplishment of a difficult task and on having provided a basis for future work on a vexed question. See also FINDLAY *ibid* Bull. 1947 v. 44 703.

11 March 1943

TROPICAL DISEASES BULLETIN

Vol 46]

1949

[No 8

SUMMARY OF RECENT ABSTRACTS*

VII HELMINTHIASIS

TREMATODES

Schistosomes General

Distribution—DE MEILLON (p 190) discusses the general subject of schistosomiasis in the Union of South Africa. *S. haematobium* has been there for many years, but *S. mansoni* was introduced recently from the north, and is spreading. He gives a list of the snail hosts of these worms, and makes the point that if the rivers of South Africa are dammed for industrial purposes they will become suitable for the breeding of snails. The immigration and settlement of large numbers of people from neighbouring countries, many of whom are infected, will tend to spread the disease unless adequate measures are taken to prevent it.

WILKINS (p 443) writes of schistosomiasis in S Rhodesia, where in Africans infection rates of 30 per cent for *S. haematobium* and 8 per cent for *S. mansoni* were found after a single examination of many thousands of specimens. He thinks that so many people are infected that treatment alone cannot cope with the situation, and he describes the methods he has found useful for killing snails in quiet rivers, ditches and canals, by means of copper sulphate. In comment, ALVES points out that the method can hardly be applied to rivers with broken and irregular banks. GELFAND (p 796) refers to the very heavy rates of infection found in the Africans of Mashonaland, and to the late sequelae and complications of schistosomiasis. Details should be sought in the original.

Schistosomiasis is common in Nyasaland and *S. haematobium* eggs were found by RANSFORD (p 618) in 50–80 per cent of urines of those in Kota Kota hospital or living on the lake shore, *S. mansoni* eggs were found in about 1 per cent of specimens of faeces, a reduction from the 7 per cent of 10 years earlier. The only snail found infected was *Physopsis globosa*. The author discusses the habitat of this snail, and the use of drainage, and of *Tephrosia vogelii*, in controlling the snail host.

LOVETT-CAMPBELL (p 793) shows that *S. haematobium*, and to a smaller extent *S. mansoni*, were common in West African troops during the war, and that infected soldiers soon broke down under prolonged stress.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 v 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

SCHWITZ (p. 348) has written a monograph on the classification and nomenclature of the Planorbidae especially of the Belgian Congo. This is a very difficult family, and the author advises that specimens taken in the field should be submitted to leading malacologists for identification.

CONYER (p. 444) makes the point that species of snails which serve as intermediate hosts of schistosomes in certain areas may be susceptible to the same species of schistosomes in other countries. He gives examples, and concludes that this species-specificity or even strain-specificity is important in any species sanitation of snails.

WRIGHT (p. 913) has summed up the geographical distribution and snail hosts of *S. haematobium*, *S. mansoni* and *S. japonicum*.

KERYXAS (p. 445) shows that *Physopsis africana* is the common host of *S. haematobium* in part of the French Sudan, and that it is also found infected with *S. mansoni*, but much more rarely. *Planorbis aduncus* is commonly a host of *S. mansoni* in the same area. He discusses other fresh-water snails investigated.

Hosts.—BOSCARDI (p. 87) has studied the development of *S. haematobium* in the host snails. He shows that the miracidia do not penetrate the skin, but enter by the mouth. He claims that only one miracidium develops in a snail, some sort of immunity seems to prevent invasion by a second miracidium. MALDONADO and ACOSTA MATEO (p. 187) on the other hand give a different account of the process of infection of *Australorbis glabratus* by miracidia of *S. mansoni*. They state that the miracidium penetrates the epidermis and that a snail may be parasitized by numerous miracidia, though not all of these will develop. The authors describe in detail the successive stages of the developing embryo in the tissues of the snail. FOX BRANT and FILLS (p. 376) have found that infection with *S. mansoni* interferes to some extent with the metabolism of *Australorbis glabratus*, but have not decided whether this effect is due to toxic action of the parasite.

HENYER *et al.* (p. 349) found that in various batches of *Oreochromis murrilli* the best results were obtained when each snail was exposed to 5-10 miracidia of *S. japonicum* (compare Boscardi above). A period of about 11 weeks is required for the development of cercariae.

Schistosomes.—CRAX *et al.* (pp. 914-915) discuss the infection of laboratory animals with the human schistosomes and VOLLERS *et al.* (p. 349) have described a perfusion technique for recovery of schistosomes from laboratory animals.

JARVIS (p. 617) has made a contribution in which he discusses the nomenclature of the genus sometimes named *Schistosoma* and sometimes *Bilharzia*. The matter has been referred to the International Commission on Zoological Nomenclature but a ruling has not yet been given.

The survival times of cercariae of *S. japonicum* and *S. mansoni* in water at various temperatures and pH values were investigated by JONES and BRADY (p. 916). Survival was possible for 8 days at 5°C. but for only one minute at 35°C. Slight acidity or alkalinity made no difference. Water treatment processes were investigated by the same authors (p. 918) for their effects on cercariae of *S. japonicum* and *S. mansoni*. Coagulation was not useful, but filtration through Swiss pad held back the cercariae completely. Certain chlorine compounds showed good effect and also two iodine compounds provided that not too much organic material was present. Certain other chemicals were also effective.

Miracidia of *S. japonicum* and *S. mansoni* are killed within 30 minutes of chlorination or chloramination to total residuals of 0.1 to 0.4 p.p.m. JONES and HENYER (p. 919) show that eggs are more resistant and are killed in 30 minutes only at total residuals of 3.9 to 11 p.p.m. though longer exposure at lower residual may be effective.

In a comprehensive investigation of the effect of sewage treatment processes on the eggs of *S. japonicum* JONES *et al* (p 917) have shown that sedimentation removes most of the eggs within 2 hours, but that anaerobic sludge digestion, sludge drying, and trickling-filter treatment were not very successful in destroying eggs. Activated sludge is a good medium for the hatching of eggs. Intermittent sand filtration, with sand of a certain size is an efficient method of removing the eggs from treated sewage.

Clinical findings—MERRIFER *et al* (p 794) in *S. Rhodesia* have found that rectal biopsy is much more satisfactory than Weller's scraping method for diagnosis of rectal schistosomiasis though the latter is of considerable value in Egypt and the Caribbean, where infections are heavy. The intradermal test with the authors' cercarial antigen gave more positive results than rectal biopsy. In *S. Rhodesia* rectal infection with *S. haematobium* is quite common.

ELIAS and TALAAT (p 715) have found liver biopsy a simple, safe and useful means of diagnosing hepatic schistosomiasis: they found eggs of *S. haematobium* or *S. mansoni* in 21 of 41 specimens from cases examined in Egypt.

LAIST (p 710) has contributed a detailed discussion of the ectopic lesions found in schistosomiasis, which are those produced outside the portal-caval venous blood channels. In 82 cases, 21 were attributable to *S. haematobium*, 12 to *S. mansoni* and 49 to *S. japonicum*: most of those due to *S. haematobium* were outside the brain but most of those due to *S. japonicum* were within it. The ectopic lesions can usually be accounted for by the natural valveless intercommunicating channel between the portal and caval veins. The lesions may develop several years after intestinal or vesical lesions have disappeared.

REUTER and KRUM (p 448) describe a case of infection with *S. japonicum* in which there was a granulomatous tumour of the brain which contained many *S. japonicum* eggs. The tumour was removed and the patient made a good recovery after the operation and after treatment with antimonials. HEST *et al* (p 624) report a case of cerebral schistosomiasis in which the signs were those of cerebral tumour. A nodule which contained eggs of *S. japonicum* was removed from the brain and under antimony treatment the patient made a good recovery.

KATZ (p 1017) reports a case in which eggs of *S. mansoni* were found in a brain thrombus and another in which they were present in a mass of fibrous tissue in the spinal canal compressing the cord.

ATTE (p 718) has written a book on biliary cancer but he points out that there is little or no evidence that the schistosomes are specific causes of cancer. He discusses diagnosis and treatment of cancer associated with schistosomiasis. MAKAI REY (p 795) reports two cases of biliary papilloma and epithelioma.

LOWMEYER *et al* (p 716) have investigated the educational attainment of European and African children suffering from schistosomiasis. They found no evidence that the disease had an adverse effect in European children but the few non-schistosome-infected African children. They discuss the implications of these findings.

best given by mouth and HAWKING and ROSS (p. 796) found that a dose of 0.2 gm. repeated daily was tolerated. They studied blood levels and tissue concentrations and the effects of overdosage in animals. HALAWANI *et al.* (p. 771) have studied the blood levels of Miracil D after oral administration and recommend that it should be given at intervals of 12 hours. WATNEY *et al.* (p. 1018) have used Miracil D in *S. haematobium* and *S. mansoni* infections in Egypt. It is given by the mouth and toxic effects are slight. It is effective against both worms, but with the doses used, complete cure is not usually obtained. In comment HAWKING refers to the better results he and his colleagues obtained, with higher doses, in S. Rhodesia. HALAWANI *et al.* (p. 77) have used Miracil D in patients infected with *S. haematobium* and they conclude that the effective dose is not less than 18-20 mgm. per kgm. daily for 7-8 days the blood concentration must reach 0.5 mgm. per 100 ml.

LIPPINCOTT *et al.* (p. 527) have studied the distribution and fate of antimony in the body after administration to patients with *S. japonicum* infection. Details should be sought in the original. In tests of white rats after administration of radio-active tartar emetic NESS *et al.* (p. 447) noted anomalies in distribution of antimony in the blood and tissues, and suggest that if rats are used to screen antimonial compounds such findings should be interpreted with caution.

GIRGIS and AZIZ (p. 446) have used an intensive 2-day course of injections of sodium antimony tartrate in the treatment of schistosomiasis in Egypt, and although they report fairly good results they incline to think this method too drastic for large-scale campaigns. TALANT and SHOUH (p. 719) have tried various intensive courses of treatment for schistosomiasis in Egypt and finally recommend two injections of tartar emetic at intervals of 6 hours, on two consecutive days (a total of 8 grains of the drug). In comment ALVES points out that certain details are not made clear by the authors.

The question of acquired tolerance to tartar emetic and some other antimonials has been studied by PAX (p. 86). Trivalent and pentavalent antimonials produce tolerance and are not cumulative: the toxicity of tartar emetic is increased if the experimental animals are starved.

As a result of experimental work on monkeys infected with *S. haematobium* SAID EL AYADI (p. 720) concludes that Repodral (Fouadim) is curative if given by the mouth together with riboflavin.

ROSS (p. 619) reports very poor results from the use of acriflavine in the treatment of schistosomiasis.

S. haematobium

GARD and MAURICE (p. 912) confirm the existence of urinary schistosomiasis in the Wady Sous region of Morocco, but GARD *et al.* (p. 1015) give evidence that infestation with *S. haematobium* has declined recently in Morocco as a whole.

BOIRON and KÖRBER (p. 93) name the endemic areas of *S. haematobium* infection in French West African territories. These are very extensive the disease being found along the main water-routes. The incidence is probably some 15-20 per cent. in schoolboys and local troops.

GORMAN *et al.* (p. 239) describe a method for hatching out the eggs of *S. haematobium* and detecting the presence of the miracidia released. It is often important to know if viable eggs are present in urine.

BLAIR and ROSS (p. 1094) describe the antigen they prepare from cercariae emitted by *Physopsis africana* infected in nature: these cercariae may not all be *S. haematobium* but no claim has ever been made that antigens from cercariae are species-specific. They have followed the course of the reaction after

intradermal injection of this antigen in infected persons, and show that it differs markedly from the course in uninfected persons. The optimum time for reading the tests is 15 minutes after the injection.

GELFAND (p 913) shows that the ureters are often affected in vesical schistosomiasis in *S. Rhodesia*, he has found ova in the submucosa and the muscular layers, and notes that the pathological changes lead to dilatation, but he has not seen true stenosis.

TALAAT (p 1093) argues that kidney function is impaired in urinary schistosomiasis and that tartar emetic treatment does not impair the function in the doses normally used.

In the hands of BLAIR *et al* (p 526) Miracid D gave poor results in the treatment of *S. haematobium* infections in *S. Rhodesia*, but later results were better, see Hawking above.

KIESER (p 526) comments on the deleterious effect of *S. haematobium* infection on the intelligence and vigour of children in South Africa.

In discussing the control of *S. haematobium* infection in Algeria, MARILL (p 798) makes the point that the disease is largely associated with the irrigation systems, and that although it is not possible to deal with all the large number of snail foci in the country, those in the irrigation canals can be controlled. Engineers should know that snail elimination is an essential part of their work. Canals should be cemented and dried periodically, and copper salts can be used for the parts of the irrigation system which are permanently under water. Similar measures are also useful in malaria control. BLAIR (p 1095) discusses the public health aspects of schistosomiasis in *S. Rhodesia*, where, he thinks, both the urinary and the intestinal forms are spreading. Attack on the worm can be pushed by intensive treatment, and on the snail by the use of copper sulphate and by the planning of irrigation works and water-storage dams with schistosomiasis in mind from the beginning. He makes the point that cercariae can live 100 hours in winter.

KHALIL and HALAWANI (p 527) do not consider that the preparation known as Cloroben is suitable for use against snails, because it is lethal to fish and rice plants.

S. mansoni

SCHWETZ and DARTEVELLE (p 348) have published a detailed study of intestinal schistosomiasis in the Kasenyi area of the Belgian Congo, in which they show that it is not particularly associated with fishing. The monograph is chiefly concerned with a malacological survey of the area from Lake Kivu to Lake Albert, and a description of the species found. SCHWETZ (p 1015) has contributed a long paper on schistosomiasis in the Lubilash area of the Belgian Congo, where the incidence of *S. mansoni* is up to 14 per cent (50 in one district). It is a disease of cultivators, and may be concerned in some cases of the condition known as *disboba*. He gives a list of the snail vectors.

HEISCH (p 671) reports infection with *S. mansoni* in 11 per cent of a group of Africans near Taveta, Kenya.

S. mansoni infection is endemic in several places in Eritrea, and FERRO-LUZZI (p 1017) has found that *Planorbis abyssinicus* and *P. ruppellii* are hosts.

LUTTERMOSER (p 447) has contributed a comprehensive account of schistosomiasis in Venezuela where there are probably more than 50 000 cases along the coast and the main drainage systems. The snail host is *Australorbis glabratus* and the author describes the methods used to eradicate it by drainage and the use of copper salts or lime. There is a special risk in connexion with the cultivation of water-cress, sugar-cane and a certain reed which is used for animal packs.

MIRAS (p. 346) has written a long monograph on schistosomiasis in Brazil where it has been estimated that some 3 000 000 people are infected. He thinks that this is probably an under-estimate. In some places the infection rate (on the evidence of examination of faeces) is as high as 56 per cent. in the age group 11-15 years. The snail hosts are *Australorbis glabratus* *Planorbis guadeloupensis* and *P. dilatatus*. [Some authorities regard *A. glabratus* as the correct name for *P. guadeloupensis*.] PORTELA (p. 347) gives an even higher figure for infection in Pedra Azul, Brazil, where he found it in 83 per cent. of 1,500 persons of all ages over 2 years. JANSEN (p. 85) shows that infection with *S. mansoni* in part of Pernambuco, Brazil, is present in 6.6 per cent. of children up to 4 years of age, not 40 as in the abstract] and that the proportion rises to 71 per cent. at age 15-24 falling to 33.4 per cent. over 35 years. The snail concerned is *Australorbis cent. metrahi*. In treatment tartar emetic gave the best results, but other antimonial salts were also useful. In a survey conducted along the Victoria Minas railway in Brazil BASTRES and PACTOJA (p. 191) found infection with *S. mansoni* in 71 per cent. of the people living near the river Doce, but in only 0.9 per cent. in communities far from that river. Infection of snails (*Planorbis dilatatus*) found in various collections of water showed a singular trend to infection in man. DE MAGALHÃES and ROCHA (p. 618) report on the increasing incidence of *S. mansoni* infection in Mina Gerais, Brazil. In some towns the rate in school children of infection is over 60 per cent.

MONTESIEUX *et al.* (p. 259) show that *S. mansoni* is an important cause of dysentery in Martinique where *Planorbis guadeloupensis* [see comment above] is the snail host.

ELSDON DEW (p. 188) has used the zinc sulphate flotation method of Faust for detecting worm eggs in faeces but though this is useful for hookworm eggs it is not so good for schistosome eggs, which do not float well.

OTTOLINA (p. 915) writes of the value of rectal biopsy in diagnosis of *S. mansoni* infections, by which means many cases negative to stool examination are found to be positive. He (p. 183) shows that if the fragments of tissue obtained by rectal biopsy are immersed in fresh water for a few minutes they become sufficiently transparent to allow schistosome eggs to be seen under the microscope. In this way a diagnosis may be made within a very short time. DA SILVA and COSTA (p. 194) also write of the value of rectal biopsy in simplifying the diagnosis of *S. mansoni* infections.

MARTINEZ VILLAFRANCA and LANC (p. 1085) have used Neostibosan for *S. mansoni* infections but without much success.

DA SILVA (p. 85) describes his tests of Stilboplex III, a compound of antimony and iodine which he has used with some success in the treatment of *S. mansoni* infections of animals and in four human cases. The drug is given intravenously at intervals of 1-3 days to a total of 10-15 injections.

NOVA BRUNTEZ (p. 619) writes of the value of splenectomy in hepatic cirrhosis which is a result of *S. mansoni* infection. The operation may relieve portal hypertension if performed before the liver damage is excessive. He gives details of 20 cases in which he removed the spleen for this condition.

VIGLI (p. 83) has investigated hermaphroditism in *S. mansoni* and notes that male worms which also possess ovaries tend especially to develop in animals which are not optimum hosts (guinea pigs and rabbits) but not in man and monkey. The development of these hermaphrodite males is also stimulated by the absence of a female partner as in animals infected by male worms only. He discusses the implications of these findings.

CRAM *et al.* (p. 914) has shown that the North American snail *Trojanella* *arctica* can act as host for *S. mansoni*.

S japonicum

WRIGHT *et al* (p 194) report a survey carried out in Japan. They used a simple sedimentation technique for the examination of faeces, and found infection in 22.6 per cent of 1,688 school children. More boys than girls were infected, and the rates varied in different places, up to 53.5 per cent in one. These results are much higher than those reported by the Japanese, and this is probably due to the more efficient examination carried out by the present authors than the single faecal smear used by the Japanese. The snail host is *Oncomelania nosophora*, and infection was found in various collections of these snails, up to 15.8 per cent in one place.

PESIGAN (p 622) reports a new focus of schistosomiasis in Luzon, Philippine Islands, the snail *Oncomelania quadrasi* was also found.

ABBOTT (p 1096) has written a handbook on the medically important molluscs of the Far East, with instructions for identification in the field. He cites five hosts of *S japonicum*—*Oncomelania quadrasi*, *O formosana*, *C nosophora*, *O nosophora slateri* and *O lupensis*.

WARD *et al* (p 915) describe their methods of maintaining snails in the laboratory, they exposed certain American snails to *S japonicum*, but only *Pomatiopsis lapidaria* showed signs of infection, and these were regarded as inconclusive. ABBOTT (p 1097) describes *Pomatiopsis lapidaria* in detail.

BRACKEN *et al* (p 1098) describe the lesions of acute *S japonicum* infection in man, their findings having been made in men killed in the war in the Philippines. The appearances are very similar to those seen in experimental animals.

HUNTER *et al* (p 623) report on trials of 10 techniques for recovering eggs of *S japonicum* from faeces. They recommend two methods which involve the use of HCl, sodium sulphate, Triton NE and ether, with centrifugation at different stages, but for details the original should be consulted. JAHNES and HODGES (p 623) use 10 per cent ethyl alcohol (sp gr 0.986) for emulsifying faeces and sedimenting eggs of *S japonicum*, with success.

Although they detected some value in intradermal tests or complement-fixation tests with antigens from adult *S mansoni* or (especially) from their cercariae, in *S japonicum* infections, BOZICEVICH and HOYEM (p 916) did not think that they were as useful as examination of faeces.

VOGEL and MINNING (p 196) have studied the effects, on adults and eggs of *S japonicum*, of tartar emetic, Fouadin and emetine injected into animals infected with that worm. These are described in detail. The first two drugs could effect cure if doses were given 15–18 times, but no cures were obtained with emetine in this series. CARROLL and HUNNINEN (p 624) treated a series of American soldiers who were infected with *S japonicum*, by intravenous injections of tartar emetic given every other day. The results were slightly better than with Fouadin.

In a test of a large number of compounds, to find those which would protect against cercariae of *S japonicum* after clothing had been impregnated with them, WRIGHT *et al* (p 527) found that an emulsion of 4.5 per cent benzyl benzoate with 0.5 per cent Tween 80 in water was the most effective. Garments impregnated with this and then dried, protect even after having been washed four times. Dibutyl phthalate emulsion is also useful, and so is a secret gas protective chemical. The type of cloth impregnated is important, wool being better than cotton or twill. The same authors (p 529) investigated the protective effects of repellents and repellent ointments for application to the skin. Many showed useful effect, but tests are needed to determine the length of time during which these would remain effective on continuous exposure to water. These experiments were conducted during the war. Similar investigations are reported by NOLAN *et al* (p 919), who found that dibutyl phthalate

STORIA, M. Segnalazione del "*Plasmodium ovale*" Stephens 1922 in Eritrea. (Nota preventiva) [Presence of *Plasmodium ovale* in Eritrea. (Preliminary Note).] *Riv di Malariaologia*. 1945, Dec. v 27 No. 6, 261-4 English summary (3 lines)

CALLOT J. Le paludisme en Alsace et en Moselle. A propos d'une enquête récente. [Recent Inquiry on Malaria in Alsace and in Moselle.] *Ann. Parasit. Humaine et Comparée* 1948, v 23 Nos. 5 & 290-95 3 maps.

Alsace was one of the most malarious regions of France in the last century. Even Strasbourg was affected. The endemic had completely disappeared however by 1893. Inquiries carried out by order of the German government after the annexation of Alsace in 1871 determined the geographical distribution of the disease. The findings as concerns Lower Alsace are recorded on a map. Foci of infection were found along the Rhine including Strasbourg and its environs in the marshland bordering the River Ill along the River Bruche and along the Marne-Rhine Canal.

Malaria was also endemic in Moselle until the middle of the last century notably in the Sarre Valley.

None of the explanations that have been advanced account satisfactorily for the disappearance of malaria about 1893 from both Alsace and Lorraine. The regularization of the course of the Rhine cannot account for it. Stabling cattle in Alsace was practised long before the disappearance of malaria. This practice may well have encouraged the deviation of *A. maculipennis* from man to cattle. *A. m. rusticus* is now the predominant species. In Lorraine cattle are not kept in stables.

A certain amount of anxiety was occasioned by the possibility that the introduction of a large number of infected persons into this area during and after the last war might reactivate these old foci of infection. Anophelines are still numerous. The author addressed an inquiry to all medical practitioners in these areas regarding the occurrence of locally acquired malaria infections. From this inquiry it was learnt that though imported cases of malaria had been widely scattered throughout the area being reported from more than 50 localities in the Lower Rhine area, only two indigenous infections over and above the few that have been published, had been observed. In these cases races of *Anopheles* theoretically capable were responsible for transmission. It would appear that the persistence of anophelism in France need occasion no undue anxiety.

Norman White

HORMANN H. Malaria in Deutschland 1945 bis 1947. [Malaria in Germany 1945 to 1947.] *Zeitschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949 v 1 No. 1 32-91 77 figs. [Numerous refs.]

This paper deals with the spread of malaria in Germany as the aftermath of war. The question arises whether this may be due to the increase of the endemic area owing to the deterioration of hygiene or whether it was due to importation of fresh cases. The incidence of malaria in Germany in the period 1945-1947 is important for the present purpose. No less than 13,826 cases of malaria were notified, and of these 3,581 were indigenous. These figures must be regarded as minimal because in the post-war period public notification became disorganised and this had distinct influence on hygiene. By far the greatest number of autochthonous cases were observed in 1946 (7,335) while the decline in 1947 (1,226) could be regarded not so much as the beginning of a definite diminution, but as result of unfavourable meteorological conditions for breeding the transmitting species of *A. gambiae*. The most heavily infected areas were the towns of Frankfurt, in Odes and Berlin also the districts of

Lebus and Bernau and the whole of Schleswig-Holstein—in these an increase of endemological distribution has taken place. A very important epidemiological consideration in this epizootic has been the existence of a reservoir of infection and the opportunities which have been afforded for its spread by the fluctuations and herding together of the population. But, apart from this, it is an entomological problem and depends upon the prevalence of *Anopheles* and especially upon the presence of appropriate races of *A. maculipennis*. Especially important is the influence of microclimate upon the distribution and predilection of *Anopheles* and their intimate human relationships.

In addition to the monthly increase of fresh infections the problem of periodic recurrences of clinical manifestations comes into play. The Dutch view that the northern European type of *Plasmodium vivax* recurs at yearly intervals and that, generally speaking, the incubation period may be prolonged to such an interval could not be confirmed in Germany.

P Manson-Bahr

SWAROOP, S. Forecasting of Epidemic Malaria in the Punjab, India. *Amer J Trop Med* 1949, Jan, v 29, No 1, 1-17, 4 charts

In 1921 the Punjab Government undertook the task of preparing annual forecasts of the probable extent of epidemic malaria, and after some preliminary work the forecasts assumed a standard form in 1923. They were at first prepared by GILL who himself devised the method based primarily on observations made by CHRISTOPHERS, but were later prepared by YACOB [see YACOB & SWAROOP, this *Bulletin*, 1945, v 42, 620]. They were based on a consideration of the rainfall, the spleen rate, the epidemic potential or co-efficient of variation of 'fever' mortality during the month of October since 1868, and the economic conditions represented by food prices.

On the partition of the Punjab, and hence the ending of these forecasts in their standard form, the author submits their results since 1923 to statistical analysis. He shows that they attained a high degree of general accuracy which has not varied materially in different periods or between the times when Gill and Yacob were responsible. There has been a steady decline in the trend of the annual epidemic figures from 1867 onwards, and epidemics appear to run in a cycle of eight years, though the author accepts this observation with caution. On statistical analysis of the utility of the factors on which forecasts are based, the author shows a previously unsuspected correlation between epidemic happenings and rainfall in the previous May (co-efficient of correlation 0.563) which should make earlier forecasts possible in future, and finds that contrary to Gill's opinions the spleen rate is not significant in forecasting so that its estimation may be omitted without loss of accuracy. [This is an excellent statistical analysis of a pioneer service. Though partition may alter the form of forecasts it would be very regrettable if they should be discontinued.]

G Macdonald

MATTINGLY, P. F. Anopheline Pupae (Diptera, Culicidae) from West Africa. *Ann Trop Med & Parasit* 1949, Apr, v 43, No 1, 23-5, 2 figs

This paper contains descriptions of the pupae of *Anopheles rufipes* var. *ingrami* and *A. flavicosta* and indicates the position of the latter species in the identification key given by DE MEILLON [this *Bulletin*, 1948, v 45, 295].

H S Leeson

in this long series made up of a great variety of infections, congenital malaria was absent. It is suggested that possibly the extraordinary number of phagocytes in the placenta constitutes an obstacle to the trans-placental passage of the parasite. Malaria in the mother appeared to affect the health of the infant by causing a low weight (2,000-2,500 gm.) at birth. Deaths in the newly born were 6-8 per cent. during the first eight days but syphilis and other conditions were found to be the cause as well as malaria.

P. C. C. Garrahan

- BIXAGNI G. Un caso di malaria atipica. (Utilità diagnostica della splenopuntura.) A Case of Atypical Malaria diagnosed by Splenic Puncture. Reprinted from *Rivista Med. Sarda* 1947 Suppl. 1 No. 34 7 pp. in *Lavori dell'Istituto d'Igiene e Unive. di Cagliari 1940-1946* 1949

The following is a translation of the author's summary —

The author describes a case of clinically atypical malaria in which the diagnosis was made after a long delay by the finding of parasites on the fourth splenic puncture while several examinations of the peripheral blood and sternal puncture were persistently negative.

H. J. O'D. Burke-Gaffney

- i. MACKERRAS M. J. & ERCOLE, Q. V. Some Observations on the Action of Quinine, Atebrin, and Plasmoquine on *Plasmodium vivax*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949 Mar v 42, No 5 443-54 3 graphs & 4 coloured figs. on 4 pls. [10 refs.]
- ii. — & — Observations on the Action of Quinine, Atebrin, and Plasmoquine on the Gametocytes of *Plasmodium falciparum*. *Ibid.* 455-60 7 graphs.

i. Many theories have been put forward to explain the mode of action of quinine and other drugs on malarial parasites. The *in vivo* studies by CHRISTOPHERS and FULTON (this *Bullet.* 1934 v 35 709) and of American authors subsequently up to the investigation of MORTIMER (ibid. 1949 v 48 445) have shown that the action is probably direct on the parasites. The present authors have recently described (this *Bullet.* 1948 v 43 306) the changes which occur in the sexual and asexual forms of human malaria during normal development in the peripheral blood and after treatment with paludrine. The present experiments carried out with Melanesian strains of *P. falciparum* transmitted by *Anopheles punctulatus punctulatus* to susceptible white hosts were made while the authors formed part of the Medical Research Unit at Cairns, Australia. The effect of quinine, atebrin (mepacrine) and plasmoquine (pamaquin) on the growth and development of the parasites in the patients' blood was observed by means of fresh preparations and stained films and in mosquitoes which were fed on the infected hosts during treatment. The appearance of parasites developing normally and those in contact with the drugs are shown in coloured plates. It appeared that quinine and atebrin acted similarly the latter more effectively on the erythrocytic stages of the parasite which metabolize haemoglobin evidenced by pigment production. Growth was affected and morphological changes were apparent after a few hours. Mature gametocytes were not affected, and developed normally in the mosquito. Plasmoquine had some effect on all stages of sexual growth and to some extent on gametocytes for no mosquito infections were obtained 42 hours after treatment started.

ii. In continuation of the experiment described above the effect of the same three drugs on the gametocytes of *P. falciparum* was studied. It was confirmed that therapeutic doses of quinine or atebrin did not influence the numbers morphology (except that atebrin sometimes gave rise to unpigmented

forms, as noted previously by SINTON [this *Bulletin*, 1939, v 36, 396]) or infectivity of mature forms to mosquitoes Quinine did, however, appear to affect young forms adversely, and numbers were ultimately reduced This effect of quinine is comparable to that noted by BLACK [this *Bulletin*, 1947, v 44, 176] in the case of trophozoites *in vitro* The marked effect of plasmoquine on gametocytes was also confirmed When mosquitoes were fed on patients three hours after treatment with 10 mgm of this substance infection still occurred, but its intensity was reduced after six hours, and notably so after nine hours At the end of 15 hours no gland infections were noted in spite of the presence of numerous sexual forms in the patient's blood up to 25 hours after treatment, when exflagellation still occurred Thereafter the gametocytes gradually degenerated and disappeared

J D Fulton

WAR OFFICE Malaria Relapses treated with Quinine and Quinine Substitutes
Statistical Report on the Health of the Army 1943-1945 1948, 273-6,
 1 chart

In accordance with a directive sent to military hospitals in the United Kingdom all cases of malaria relapse were to be treated with one or other of the two following courses of treatment, without any further antimalarial maintenance treatment

Course I Mepacrine 0.2 gm, with a copious draught of fluid, every six hours for 48 hours, then 0.1 gm thrice daily after food for 10 days

Course II Quinine in solution ten grains and pamaquin 10 mgm, concurrently, thrice daily after food for 10 days Patients to remain in hospital throughout treatment, pamaquin to be discontinued if cyanosis or abdominal colic appear

Six hundred and fifty patients with *P. vivax* relapses were treated with Course I, 584 with Course II During a period of five months from the end of treatment the percentage of patients who relapsed after Course I was 34, after Course II, 10.3 Relapses after Course II occurred earlier (maximum in fifth week) than after Course I (maximum in eighth week)

The same superiority of Course II in preventing relapse was noted in the treatment of first attacks The relapse rate after the treatment of 100 such cases with Course I was 29 per cent, of 76 cases with Course II, 5 per cent (five months period)

A graph which is appended to the text illustrates the periodicity of *P. vivax* relapses with a major peak in the second and a minor peak in the ninth month

Norman White

WAR OFFICE B T Malaria Relapses treated with Paludrine *Statistical Report on the Health of the Army 1943-1945* 1948, 277

Male patients suffering from relapsing *P. vivax* malaria admitted to the Colchester Military Hospital were treated alternately with one of the three following methods of treatment —

A Quinine 10 grains and pamaquin 10 mgm thrice daily for 10 days

B Paludrine [proguanil] 25 mgm twice daily for 10 days

C Paludrine 250 mgm twice daily for 10 days

Every third patient received one and the same treatment, consecutive patients in order of reception received different treatments Follow-up was by written questionnaire Six months after the end of treatment the results were —

Course A 107 treated, 19.6 per cent had relapsed

Course B 108 treated, 54.4 per cent had relapsed

Course C 107 treated, 48.6 per cent had relapsed

The paludrine courses were much less effective in preventing relapse than quinine-pamaquin but it may be that more frequent administration of paludrine would give results as good as or better than those obtained with quinine-pamaquin.

Norman H. Bell

COATNEY G. R. *Chemotherapy of Malaria. Bol. Oficina Sanitaria Panamericana* 1949 Jan. v 28, No. 1 27-37 4 figs. (4th rels.)

This is a succinct account of the newer antimalarials which should prove of value to those called upon to treat the various forms of the infection. Much of the co-ordinated search for new drugs of this type was carried out in the United States and to a lesser extent in Britain. In the U.S.A. more than 1400 compounds were tested against avian malarial infections and the pharmacology and toxicology of a proportion were studied in mammals. About 100 were tested in human patients. In view of the shortcomings of quinine SHANLEY and co-workers made an intensive physiological and antimalarial study of atebrom (mepacrine) and, in conjunction with the work of FAIRLEY the knowledge thus acquired allowed this substance to be used with remarkable success as a suppressant in the field. Chloroquine (SN 7818) a 4-aminoquinoline synthesized and tested by the Germans, is a limited extent, under the name resochin as early as 1934 ranks high as a therapeutic and suppressive agent. (For a description of its properties see this Bulletin 1946 v 45 708. HIKETH has recently stated that this substance was captured in North Africa in 1941 and taken to America where its constitution was discovered. The present account of its history differs somewhat.) It may be given intramuscularly to comatose patients and rapidly relieves acute attacks of the three human malarial. Other substances of value in the series are vantoquin (SN 8811) (a 3-methyl derivative of resochin also made by the Germans) oxychloroquine (SN 8317) and camoquin (SN 10751). Paludrine the chief British contribution to this field of research, is of outstanding value as a therapeutic and suppressive agent with a wide margin of safety. In practice the author does not consider it superior to chloroquine. Pentaquine (SN 13276) this Bulletin 1947 v 44 396 and isopentaquine (SN 13274) which are 8-aminoquinolines related to pamaquin (plasmoquine) appear to have definite advantages over the latter. When given along with quinine the relapse rate in benign tertian malaria was considerably lowered. Although less toxic than pamaquin these substances require to be given under medical supervision because of danger to the circulatory system and their routine use with quinine is not recommended.

Abstracts of papers on the chemotherapy of these substances have appeared in this Bulletin.

J. D. Fulton

HIKETH W. & MUDROW REICHENOW. *Lith. Neue Wege in der Chemotherapie der Malaria. New Developments in the Chemotherapy of Malaria. Dtsch. med. Woch.* 1949 Jan 28 4 v 4 97-101 29 refs.

This is a short review of progress in the chemotherapy of malaria dating from the discovery of plasmoquine and atebrom (mepacrine) to the present day. It has a hard luck ring about it. During the war when it was found that quinine in reasonable doses failed to act satisfactorily as a prophylactic or suppressant atebrom in daily doses 1.01 gm was found to be effective as a suppressant. Before the war a certain amount of doubt was expressed as to the value of atebrom in Britain and in Germany search was therefore made for a drug to replace it. Resochin and vantoquin were synthesized then the

the late war They bear a constitutional resemblance to atabrin, if one benzene ring and substituents be removed from the latter, resochin being 4-diethylaminoisopentylamino-7-chloroquinoline and sontochin its 3-methyl derivative Both resembled atabrin in properties, and were active against schizonts but had no causal prophylactic action They did not colour the skin and could be used with plasmoquine [pamaquin] without giving rise to untoward effects In 1943 sontochin was captured by the Allies in North Africa The whole series including resochin was discovered as a result of intensive work in America [see also COATNEY, above] The latter was named chloroquine (SN 7618), and its properties have been fully described [this *Bulletin*, 1946, v 43, 708] Resochin and sontochin were also tested by FAIRLEY at Cairns, Australia, during the late war Nivaquine C is the dihydrochloride of sontochin, other salts were given the names Nivaquine M or R, and were preferred by the French to atabrin Reference is also made to the discovery of paludrine, some space being devoted to the fact that resistance to it has been induced in *P. gallinaceum* but no reference is made to the fact that similar resistance to plasmoquine was readily induced in *P. knowlesi* The search for something to replace plasmoquine, which was toxic, led to the discovery of Certuna in Germany before the war and to pentaquine in the U.S.A. during the war, but neither has come into general use Although large numbers of new sulphonamides have been synthesized, all have proved disappointing in treatment of malaria Endochin, a 4-hydroxy-quinaldine tested by the author had marked prophylactic properties in bird malaria but was inactive in human and monkey malaria In a search for guidance in the synthesis of active substances in malaria later work has tried to elucidate the metabolic requirements of plasmodia and the mechanism of drug action It remains to be seen whether the more scientific approach will yield more fruitful results than the older method of trial and error

[All the investigations mentioned in this article have been abstracted in this *Bulletin*]

J. D. Fulton

COVELL, G. NICOL, W. D., SHUTE, P. G. & MARION, M. Studies on a West African Strain of *Plasmodium falciparum* II The Efficacy of Paludrine (Proguanil) as a Therapeutic Agent *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Mar., v 42, No 5, 465-76, 1 chart [10 refs.]

The authors describe therapeutic trials with paludrine, carried out at Horton, with a W. African strain of *P. falciparum* whose origin was described in Pt 1 of this series [this *Bulletin*, 1949, v 46, 437] The object was to clarify some outstanding questions with regard to treatment of infections with this strain During maintenance of the strain by serial blood and mosquito transmission (*A. stephensi* from India were used), it was only in contact with paludrine on one occasion All the patients were neurosyphilitics who had undergone malarial therapy 9 or more years earlier Successful trials of this drug with W. African and New Guinea strains of *P. falciparum* have previously been reported [this *Bulletin*, 1946, v 43, 402, 527, 1947, v 44, 282] In Malaya and India results were not so satisfactory In Sardinia, BETTINI [this *Bulletin*, 1948, v 45, 861] found that the clinical response in malignant tertian infections was satisfactory, but relapses occurred At Horton 31 patients were inoculated intravenously with sporozoites from two infected mosquitoes of the same batch It appeared that the numbers of sporozoites injected did not appreciably affect the severity of the attack or the number of relapses The patients were divided into 6 groups and, when temperatures reached 100°F and parasites were present in the peripheral blood, treatment was given as shown —

Group	Number in each group	System of Treatment	Result
1	5	Paludrine mgm. 300 once daily for 14 days	All relapsed within 3 weeks. One had second relapse after further treatment.
2	5	Paludrine mgm. 300 twice daily for 7 days	4-5 relapsed within 3 weeks and when re-treated there were further relapses.
3	8	Paludrine mgm. 300 twice daily for 10 days, plus mepacrine mgm. 300 thrice daily on the first day only	No relapse over 6 months.
4	5	Paludrine mgm. 300 twice daily for 10 days, plus quinine hydrochloride grains 10 thrice daily on the first day only	No relapse over 6 months.
5	5	Quinine hydrochloride grains 10 twice daily for 10 days	No relapse over 6 months.
	2	Quinine hydrochloride grains 10 thrice daily on one day only	The rapidity of clinical response was in the order mepacrine paludrine quinine.
6	2	Mepacrine mgm. 300 thrice on one day only	For clinical reasons the treatment outlined was not adhered to.
	2	Paludrine mgm. 300 thrice on one day only	

Gametocytes disappeared from the blood of all patients except one treated with paludrine and quinine. In those who had relapses gametocytes were present except in one case. Paludrine was effective in controlling the clinical attack as other authors have found, but asexual parasites disappeared from the peripheral blood more slowly than after treatment with mepacrine or quinine. Unlike FAIRLEY who used a New Guinea strain of the parasite and obtained a radical cure in 46 out of 47 cases the present author was unable to effect radical cure with the Lagos strain. The series is small, and it is possible that the relapses are associated with early treatment of the primary attack in absence of immunity. Because of the favourable results obtained by reinforcing paludrine treatment with mepacrine such a course is recommended in all cases of this potentially dangerous infection. The replacement of mepacrine by quinine is not recommended although both drugs helped to prevent relapses. As found by other authors paludrine prevented development of gametocytes in mosquitoes. The following paragraph is taken from the authors' summary—

"It is considered that a course of paludrine (mg. 300) twice daily for 10 days, reinforced with mepacrine (mg. 300) given in three doses on the first day of

treatment and followed by a maintenance dose of paludrine mg 100 daily for the ensuing 6 weeks would fulfil the main objectives in the treatment of falciparum malaria, namely, rapid termination of the clinical attack, a high radical cure rate, sterilization of gametocytes and minimum risk of injurious side effects "

J D Fulton

ABBOTT, P H Proguanil in the Sudan [Correspondence] *Brit Med J* 1949, Mar 5, 413-14

The writer of this letter states that he has found proguanil (paludrine) to be a very valuable malaria prophylactic in his district of the Southern Sudan where *P falciparum* malaria is hyperendemic For the last two years it has afforded very adequate protection to a number of British officials and Northern Sudanese Arabs who have been under his care If 350 mgm per week be taken regularly (half a tablet each morning at breakfast time) the chances of developing a clinical attack of malaria are very small indeed In the treatment of *P falciparum* malaria proguanil has, however, given disappointing results Doses of 100 mgm thrice daily for ten days reduce the fever less rapidly than does either quinine or mepacrine positive blood films have been found on the fifth day of such a régime

Norman White

FERRO-LUZZI, G Nuovi esperimenti sul trattamento paludrinico della terzana maligna in Eritrea [Further Experiments on the Treatment of *P falciparum* Malaria with Paludrine in Eritrea] *Bol Soc Ital di Med e Igiene Trop* (Sez Eritrea) 1948, v 8, Nos 5/6, 209-14 English summary

The author has previously reported the failure of paludrine in doses of 0.2 to 0.3 gm a day for ten days in the treatment of patients suffering from *P falciparum* malaria in Eritrea [this *Bulletin*, 1949, v 46, 213] In this paper he records the results of the treatment of 50 additional patients with 0.6 gm paludrine a day for ten days, and 50 patients with mepacrine for seven days and pamaquin for a further five days There was little if anything to choose between the two methods of treatment with regard to the duration of fever or the persistence of trophozoites in the blood With regard to the relapse rate, however, paludrine showed up badly Within 20 days from the end of treatment with paludrine 34 per cent of the patients relapsed, as compared with 2 per cent after mepacrine-pamaquin treatment It is suggested that the local Eritrean strains of *P falciparum* have a particular resistance against paludrine

Norman White

CANET, J Efficacité comparée de la nivaquine et de la paludrine dans le traitement curatif de l'accès palustre aigu, en Indochine [Comparative Efficacy of Nivaquine and Paludrine in the Treatment of Acute Malaria in Indo-China] *Bull Soc Path Exot* 1948, v 41, Nos 11/12, 661-6

In a hospital in Indo-China, 140 patients suffering from acute attacks of malaria were treated with nivaquine, and 140 with paludrine The dose of each drug was 0.30 gm a day The two groups of patients were comparable in each there were 120 *P falciparum* and 20 *P vivax* infections Both drugs were effective, but the action of nivaquine was more rapid than that of paludrine both as regards the control of fever and the rate of disappearance of schizonts from the peripheral blood On the morning of the third day 93 per cent of the *P falciparum* patients treated with nivaquine were afebrile as compared with 66 per cent of the paludrine-treated patients On the fourth evening 76 per cent of the nivaquine *P falciparum* patients were free from demonstrable parasites as compared with 60 per cent of the paludrine group Similarly with

the *P. vivax* infections on the third evening 85 per cent of the nivaquine patients were afebrile as compared with 70 per cent of the paludrine patients on the sixth day 45 per cent. of patients receiving paludrine harboured parasites as compared with 5 per cent. of the nivaquine treated patients.

Neither drug had any action against the sexual forms of *P. falciparum* and nivaquine none against sexual forms of *P. vivax*. The possible activity of paludrine against *P. vivax* gametocytes calls for further inquiry.

The curative action of nivaquine on the general symptoms of acute malaria was more prompt and more constant than was that of paludrine.

Both drugs were equally well supported. Symptoms of intolerance were rare and insignificant. The author considers both drugs to be a distinct advance on older synthetic remedies such as mepazine.

Norman White

CROGGESHALL, L. T. & RICE, F. A. Cure of Chronic Vivax Malaria with Pentaquine. *J Amer Med Ass* 1949 Feb. 1., v 139 No. 7 437-8.

This paper reports the treatment of 185 ex-servicemen, suffering from relapsing vivax malaria with pentaquine and quinine. Pentaquine is a derivative of pamaquin than which it is less toxic and more effective. Infection in 154 of these men had been acquired in the South-west Pacific. The majority had been suffering from relapses every four to six weeks before treatment began. Pentaquine 30 mgm. and quinine 2 gm. were given daily for 14 days later the dose of quinine was reduced to 1.0 gm. daily. The reduced doses of quinine were given in 67 cases and proved to be as effective as the larger doses. After treatment the patients were observed for six months or longer. In only ten was a further relapse noted, with parasites in the blood. Ten others had chills but no parasites could be found in their blood smears. One hundred and sixty three have had no further symptoms referable to malaria. A striking relief from the subject's symptoms associated with chronic malaria was experienced by nearly all. The treatment was ambulatory and did not necessitate interruption of normal activities. Toxic reactions were largely those associated with the use of quinine.

Norman White

BIRD, S. C. & NEWBURY, G. The Search for Chemotherapeutic Amidines. Part I. Substituted 4,4-Diamidino-m-Dibenzosilole and -Diphenyl Ethers. *J Chem. Soc.* 1949 Mar 642-6.

CYMERMAN, J. & SHORT, W. F. Amidines. Part XII. Preparation of 9-Substituted Phthalimides from N-3-Diphenyl-amidines. *J Chem. Soc.* 1949 Mar 703-7.

KIRBY, K. S. Quinamines. Part III. m-Quinamines. *J Chem. Soc.* 1949 Mar 735-7.

MCCOBBREY, A. & MATTHEWSON, D. W. Contributions to the Chemistry of m-Quinolines. Part I. The Synthesis of Diamino-1-Phenylmiquinolines Methiodides in a Search for New Trypanocides, with some Observations on the Nitration of 1-Phenylmiquinolines. *J Chem Soc* 1949 Mar 696-01 2 charts.

DAVEY, F. & SMITH, M. Malaria Prophylaxis with Proguanil. (Correspondence) *Brit Med J* 1949 May 28 856.

The writers of this letter refer to reports of *falciparum* malaria occurring in persons taking more than 0.1 gm. of proguanil on alternate days this March 1949 v 45 477. *Brit Med J* 1949 Feb 10 724 and the recommendations

of these authors, implemented by the Colonial Medical Research Committee [thus *Bulletin*, 1949, v 46, 608], that the prophylactic dose of proguanil should be 0.1 gm daily

They then describe a case in an endemic area in Nigeria where malaria due to *P. falciparum* occurred in a European nursing sister who had been taking 0.1 gm of proguanil daily as a prophylactic

The patient had been in Nigeria for nine months, and during the whole of that time had only occasionally missed taking a regular daily tablet of proguanil—at most this omission amounted to one a week and usually much less than this. She had had several mild and short attacks of pyrexia and in the absence of proved parasitaemia and because of their clinical nature the attacks were considered to be caused by a dengue-like fever. After the last attack she increased her dose of proguanil to 0.2 gm daily for eight days and then reverted to 0.1 gm daily

A month later, she developed an evening temperature of 101°F. Thick blood films then revealed the presence of 2 to 20 young *P. falciparum* trophozoites per microscopic field. Thin films showed some red cells with two or three parasites, some parasites with double chromatin dots and the presence of accolé forms, a picture typical of the acute *falciparum* infection seen locally in children

Increased proguanil and mepacrine aborted the attack and the temperature fell and remained normal from the next day. On the 14th day of the attack, gametocytes were found in the blood

It seems clear that in this case a daily dose of 0.1 gm of proguanil was insufficient to prevent a break-through of *falciparum* malaria

H J O'D Burke-Gaffney

BERBERIAN, D A & DENNIS, E W. Field Experiments with Chloroquine Diphosphate. *Amer J Trop Med* 1948, Nov, v 28, No 6, 755-76, 1 chart

The observations recorded were designed to test the value of chloroquine diphosphate in the treatment and prevention of malaria in rural communities. For this purpose two villages in Lebanon, Saideh and Azouniyeh, were selected. Malaria is hyperendemic in both, the transmission season lasting from the end of April to the end of November. *A. sacharovi* is the chief vector in Saideh, in Azouniyeh *A. superpictus* is predominant, but *A. claviger* and *A. martensi* also occur. The populations of the villages number about 215 and 200 respectively

In Saideh 93 persons were examined on August 25, 1946. These included all who were acutely ill on that day, those who had been ill recently and those who agreed to take suppressive treatment. Twenty-six of these persons were febrile and were each given a therapeutic course of chloroquine diphosphate. The remainder each received a single suppressive dose of the drug. This procedure was repeated at weekly intervals. On each occasion the numerous cases of fever that occurred among the "control" group of the population were treated and other members of the control group demanded and received suppressive medication. By November 18 all the villagers were receiving weekly suppressive doses of chloroquine diphosphate. This was continued till April 7, 1947. During the period of observation 70 attacks of malaria occurred among the diminishing control group, there were no attacks among those on suppressive medication.

The therapeutic dosage was for children under five years a total dose of 2½ tablets (0.25 gm each) spread over three days, for children 5 to 10 a total dose of 2½ to 5 tablets, for older ages a total of 5 tablets. This adult dose was insufficient in 7 of 45 cases, 3 *P. vivax* and 4 *P. falciparum* infections. In these cases a second course was given comprising double the dose prescribed for the

first treatment. The adult suppressive dose was 0.5 gm. * tablets, in a single dose once a week.

When chloroquin suppression ceased on April 7 an intensive treatment of the village with DDT started. The DDT treatment was repeated in July. During the period April 8 to November 23 1947 only three cases of malaria occurred in Saldich, two in May and one in June. Two of these were recurrences and one probably a fresh infection.

Observations in Azounyeh were on somewhat different lines but they support the conclusion that chloroquine diphosphate is a most effective curative and suppressive drug for malaria as it occurs in the Middle East. It is effective against *P. m.* as *P. falciparum* and *P. malariae*. Effective doses may be given to infants and during the course of pregnancy. By combining weekly prophylactic medication with DDT measures it is possible to eradicate malaria from a community within the period of a single transmission season.

Norman H. Aik

STIERLI H & STENBURG, R. L. Some Developments in Insecticide Dispersion Equipment. *J. National Malaria Soc.* 1949 Mar v 8 No. 1 100-108 7 figs.

There is a need for the improvement of equipment for spraying insecticides and the author considers several defects in common equipment and the means of remedying them. The hand-pump sprayers of the knapsack type are very wasteful of operators' time and some form of mechanical air compressor to charge tanks as car tyres are commonly charged is considered essential in any efficient scheme. Aluminium is better than other metals for the manufacture of tanks, and there is need for improvement in housing shut-off valves and other parts.

Several types of sprayer made from surplus war materials, such as aircraft compressed-air tanks are described together with a new design made from fresh material. In essence it consists of two cylindrical aluminium tanks of 6½ in. and 8 in. diameter the smaller holding 2 gallons of fluid is situated within the larger the space between acting as the air reservoir. It is given an initial charge of 80 lb. per sq. inch and will discharge the liquid contents at a constant pressure of 40 lb. per sq. inch. A modification of a previous shut-off valve which has quick action and prevents leakage round the release pin is described. Brief information is given about an "Institution Sprayer" with an electric or petrol power unit suitable for the routine treatment of hospital wards, warehouses and large buildings, and of a "Multi-Purpose Insecticide-Dispensing Machine" which consists of a collection of apparatus on a truck capable of undertaking a wide range of insecticide work including the distribution of dust and liquid. The modifications proposed seem sound and the apparatus described is probably a considerable advance. In the absence of scale drawings it is only possible to understand and not to re-duplicate the designs. (Mardon)

FERGUSON F F UPROOT W M & INMUNA S W A Summary of the Experimental Use of DDT as a Mosquito Larvicide. *J. National Malaria Soc.* 1949 Mar v 8 No. 1 32-49 140 refs.

This is itself a highly condensed summary. It consists of a classified account of the literature on the use of DDT as a mosquito larvicide with very full bibliography with some authoritative opinions on present trends in practice. It could be consulted in the original by all interested in the subject.

The account covers all aspects of the subject and a few outstanding points may usefully be listed. United States authorities recommend that the dosage should not exceed 0.1 lb DDT per acre. Where reasonable precautions are taken DDT larvicides may be used without danger to the health of workers. Though larvae are extremely susceptible to DDT, pupae are very resistant. Residual larvicide action has not been achieved except under exceptional conditions, the explanation propounded being that DDT is absorbed upon the organic soil components of a pond-bottom complex. There is no significant difference between the susceptibility of different types of larvae. Pond wild life may readily be destroyed by DDT, particularly by emulsions, unless great care is used. Of the many methods of application used the author considers that the oil/mist technique described by FERGUSON *et al* [this *Bulletin*, 1947, v 44, 645] is possibly the most effective manual method. Several references are given to air distribution and to the effect of particle size and its measurement.

The author considers that future development in the field of DDT liquid larviciding may be chiefly centred in basic studies of the type of solvent and solvent spraying agent, and continued efforts to improve dispersion equipment.

G Macdonald

NAIR, C. P. Effect of DDT Barrier Spray in *A. sundanicus* Area in Malaya. *Med J Malaya* 1949, Mar, v 3, No 3, 198-203, 1 map.

DDT as a 5 per cent solution in kerosene was applied as a barrier spray to a strip of ground 50 yards broad around experimental sites. The dose was 6 gallons per acre (1.1 oz DDT per 1,000 sq ft) and the fluid was applied from hand atomizing sprayers on a carefully regulated technique. In one experimental area the barrier spray only was applied. In the second it was supplemented by spraying the external walls of the houses up to a height of 7 ft. In the third it was supplemented by this same external spray and an internal house spray delivered from atomizing guns in the manner common with the use of immediate insecticides. Comparable groups of houses were left as untreated controls.

Mosquito catches showed an immediate disappearance of anophelines (presumably mostly *A. sundanicus*), and a marked reduction in culicines. Observation was stopped when the anophelines in the treated houses reached one-tenth of the number in the untreated, and this occurred between 9 and 14 days, there being no difference in the three areas.

G Macdonald

SCHMIDT, L. H., GENTHER, Clara S., FRADKIN, Rochelle & SQUIRES, Wanda. Development of Resistance to Chlorguanide (Paludrine) during Treatment of Infections with *Plasmodium cynomolgi*. *J Pharm & Exper Therap* 1949, Mar, v 95, No 3, 382-98, 4 figs [14 refs].

While studying the effects of chlorguanide [paludrine] on blood-induced infections of *P. cynomolgi* in rhesus monkeys it was noted that hosts which had earlier been treated with small amounts of the drug were no longer freed from infection by doses normally curative. The strain showed stable characters to other antimalarials. In the experiments now described, infection was also produced by intravenous inoculation of sporozoites from *A. quadrimaculatus*. Drugs were given in aqueous solution by stomach tube twice daily for 7 or 14 days. Blood smears were examined in thick and thin films, and the proportion of the different parasite stages noted. If parasites remained absent from the blood for 8 weeks or more after treatment and failed to reappear within 4 weeks after splenectomy the animal was considered to be cured.

Doses of 0.075 mgm. paludrine or less per kilo were able to suppress parvartemia and 0.4 mgm. per kilo effected cure in more than 90 per cent of cases. It should be noted that in rhesus monkeys this infection is self-limiting within a period of 4 months. Resistance was produced to paludrine by the classical method of serial passage and use of gradually increasing sub-curative doses.

After passage through three monkeys from a host with partially resistant parasites it was found that the maximally tolerated dose of 40 mgm. per kilo of paludrine was non-curative and did not appreciably affect the course of infection thereby indicating a 2,000-fold resistance. [In this connexion the authors note that only a four fold resistance to plasmoquine was obtained in *P. knowlesi* infections of rhesus monkeys (this Bulletin 1942, v 30, 426). It should be observed however that plasmoquine is a toxic drug and as in their case the maximum tolerated dose did not influence the infection.] Whereas in the normal strain (*P. cynomolgi*) the drug allowed the development of schizonts but prevented segmentation, in the resistant strain growth and reproduction were unaffected, and morphological changes in the parasites were absent. The resistant character persisted unchanged after mosquito passage and likewise after 6 blood passages over a period of 5 months. The resistance to paludrine did not involve resistance to chloroquine or quinine in blood induced infections, or to pentamidine in sporozoite-induced infections. No evidence was obtained of induced resistance to quinine atabrin (quinacrine) chloroquine oxychloroquine pamaquin pentamidine or isopentamidine. The authors believe that these drugs attack the parasite in a different way from paludrine.

A brief discussion is given of the implications of this developed resistance to paludrine. The authors note specially that mature trophozoites and early schizonts of *P. cynomolgi* are affected by the drug without the accompanying morphological changes, which characterize the action of other antimalarials. Also the parasites in contact with paludrine remain for several days in the blood whereas after treatment with other drugs they may disappear in a few hours. They indicate a parallel to the readiness with which resistance of bacteria to the bacteriostatic sulphonamides is produced, as opposed to the difficulty of producing it by bactericidal penicillins. It is possible that the resistance produced in *P. cynomolgi* by paludrine may result from mutation.

[For evidence of acquired resistance in different plasmodia to quinine plasmoquine paludrine, see this Bulletin 1941 v 18, 86 1933 v 30, 860 1935 v 32, 116 1941 v 39, 438 1943 v 40, 754 1947 v 44, 869 970 1948 v 45, 158.]

J. D. Fallon

RAGAN, H. A. Effect of Humidities and Temperatures on the Size and Number of Oocysts of *Plasmodium gallinaceum* transmitted by a Mosquito. [Correspondence.] Nature 1949 Apr 23 643-4

Aedes aegypti mosquitoes were infected by allowing them to feed upon chicks whose blood contained numerous gametocytes of *P. gallinaceum*. Batches of twenty of the engorged mosquitoes were then transferred to celluloid cylinders covered with netting and placed in jars of differing humidities, the humidity being controlled by mixtures of sulphuric acid and water at 50, 70 and 70 per cent. Three of each cylinders were kept at 25°C. three others at 18°C. (A relative humidity of 30 per cent. or of 80 per cent. caused the mosquitoes to die rapidly.) On the sixth day all the mosquitoes remaining alive were dissected and the results were as follows:—

	18°C			25°C		
Relative humidity	50	60	70	50	60	70
Number of mosquitoes	12	17	15	13	16	14
Mean number of oöcysts	11	29	29	11	33	32

The different humidities did not affect the size of the oöcysts (the size was, however, affected to a small degree by the temperature, those kept at 25°C being about 20 per cent larger than those at 18°C), but they clearly had an action on the number of oöcysts, a low humidity reducing the number to nearly a third of the numbers occurring at 60 or 70 per cent. It is stressed that in nature where mosquitoes have access to drinking water, a low humidity in the external environment might not have this effect.

[The optimum conditions for the development of different plasmodia in species of mosquitoes are still imperfectly known, studies such as this are, therefore, valuable]

P C C Garnham

GRAY, A & HILL, J. Antimalarial Studies in the Quinoline Series. *Ann Trop Med & Parasit* 1949, Apr, v 43, No 1, 32-8 [18 refs]

The activity of a number of quinoline derivatives has been tested in blood—induced and sporozoite—induced infections of *P. gallinaceum* in which methods already described [this *Bulletin*, 1946, v 43, 394] were used, and in blood-induced infections of *P. relictum* by the method of Roehl. When pamaquin (plasmaquine), pentaquine and R36 (8-γ-aminopropylamino-6-methoxy quinoline) were converted to the 1,2,3,4-tetrahydro derivatives it was found that they were less active than the unreduced compounds. Toxicity was also reduced in the first two substances by this treatment. The compound R36 was originally shown by TATE & VINCENT [this *Bulletin*, 1934, v 31, 434] to possess considerable activity in *P. relictum* infections of canaries and is also very active against *P. gallinaceum*. The present authors believe that its presence as an impurity is largely responsible for the activity of the related substance R63. This latter compound, as used by the authors, was considerably less active than pamaquin in both infections. The activity of a number of compounds related to the 4-aminoquinoline chloroquine [this *Bulletin*, 1946, v 43, 708] and its 3-methyl derivative sontoquin, both of which were originally synthesized in Germany and later studied intensively in America, has also been investigated. It was found that the greatest activity was present in derivatives with the chlorine atom in position 7 in the quinoline nucleus as in chloroquine itself. Activity was reduced by the introduction of one (sontoquin) or two methyl groups.

J D Fulton

TRYPANOSOMIASIS

- 1 FRIEDHEIM, E A H. Melarsen Oxide in the Treatment of Human Trypanosomiasis. *Ann Trop Med & Parasit* 1948, Dec, v 42, Nos 3/4, 357-63
- 11 ———. Mel B in the Treatment of Human Trypanosomiasis. *Amer J Trop Med* 1949, Mar, v 29, No 2, 173-80
- 111 ———. The Active Form of Tryparsamide, TPB, in the Treatment of Human Trypanosomiasis. *Ibid* 131-4
- 1 Melarsen oxide is the trivalent analogue of the pentavalent arsenical, Melarsen [FRIEDHEIM, this *Bulletin*, 1941, v 38, 634, WILLIAMSON and

SAMPATH A. & LITTLE, P. Cultivation of *Trypanosoma cruzi* in Liquid Media. *J. Bacteriology* 1949 Feb. v 57 No. 2, 265

The junior author with SREBRAROW [this *Bull.* 1948, v 43 538] described a liquid medium for the cultivation of *Trypanosoma cruzi*. For two years, they have now been using a more enriched basal medium with the use of which they are able to grow *T. cruzi* in the coagulum-free filtrate obtained by extracting fresh coagulum of rabbit red blood cells with basal medium.

The enriched medium has the following formula —

1	Peptone (Difco)
1	" Casamino acids "
0.5	Sodium chloride
0.2	Glucose
10 mgm.	β -Alanine
10	Glycine
2	" Folic acid
2	" Nicotinamide
2	Thiamine
2	" Choline

Optional 1 per cent corn steep liquor free of alkaline precipitate (The corn steep liquor was adjusted to an alkaline pH filtered, and neutralized before use. It prolonged the viability of cultures.)

This has been found better than the original medium for certain strains of *T. cruzi*. It may be used with the rabbit-blood coagulum already described or the medium may be activated by the addition of 10 grs. of semi-dry fresh coagulum per 100 cc. The whole is mixed in a Waring blender and filtered. The activated filtrate remains stable after autoclaving and may be kept in a refrigerator for several months. *II J. O'D. Burke-Gaffney*

BORRERO, R. A. El ojo mongólico y el xenodiagnóstico artificial en la investigación de la enfermedad de Chagas. (Nota Previa) [The Mongol Eye in the Artificial Xenodiagnosis of Chagas's Disease.] *Semana Med.* 1949 Apr. 1 v 50, No. 16, 327-8, 2 figs.

LAUREY L., LAPODSEY H. & JEANPIERRE C. Sur quelques caractères différentiels entre deux souches de *Trypanosoma brucei*. [Some Differential Characters between Two Strains of *Trypanosoma brucei*.] *C. R. Soc. Biol.* 1949 Jan. v 143 No. 1/2, 6-8.

HARVEY S. C. The Carbohydrate Metabolism of *Trypanosoma leishmanium*. *J. Biol. Chem.* 1949 May v 179 No. 1 433-53, 2 figs. [34 refs.]

LEISHMANIASIS

RAMOS E SILVA, J. Leishmaníase. Considerações sobre a forma generalizada da leishmaníase tegumentar americana. Leishmaníase a Generalized Form of American Cutaneous Leishmaniasis. *B. San. St. São Paulo* 1949 Jan. 22 & 29 v 61 No. 45 23-6 3 figs. English summary

Multiple lesions of cutaneous leishmaniasis are usually the result of auto-inoculation by digital transfer or of multiple infections. Here the author

records the case of a man of 53 years with an initial espundia sore on the left leg, followed by two sores of the hip and chin, possibly, even probably, caused by auto-inoculation and digital transfer. These were succeeded by lesions on the neck, trunk (back and front) and arms, furunculoid in appearance, with a lymphangitis and adenitis. Wassermann reaction was negative and beneath the crusts of the lesions abundant leishmania could be found. These disseminated papulo-pustular lesions appeared about two months after the primary lesion. Though the facial sores were probably the result of auto-inoculation, the presence of lymphangitis and lymphadenitis indicates extension by the lymphatics and the wide dissemination may be ascribed to a spread by way of the blood-stream.

H Harold Scott

FEVERS OF THE TYPHUS GROUP

MEXICO Primera Reunion Interamericana del Tifo Mexico, D F 7-13 de octubre de 1945 [The First Inter-American Conference on Typhus] 455 pp, numerous figs 1947 Mexico

This volume contains a collection of papers read at the First Inter-American Conference on Typhus, which was held at Mexico City in October 1945.

Most of the papers would have been of great interest if they had been published soon after the holding of the conference, but the great delay in publication is not so unfortunate as it would have been if the contributors had not published the substance of their articles elsewhere.

The papers on the distribution of the fevers of the typhus group in various countries of the American Continent will be of interest to students of the geographical distribution of the diseases. The name typhus is used in its broad sense by most of the contributors, and so includes the tick-borne disease which, though called by different names, is now regarded as being the same as Rocky Mountain spotted fever throughout the American Continent.

The list of authors is impressive, it contains such well-known names as Amigstein, Camargo, Castañeda, Cox, Craigie, Dyer, Macchiavello, Pinkerton, the late Col Plotz, Soper, and Topping, but there is little in their contributions that has not been reviewed in this *Bulletin*.

In view of the controversy that has arisen in connexion with priority for the initiation of mass-dusting of fully clothed persons by insecticide dusts, a brief reference may be made to the paper by F L SOPER, F S MARKHAM, W A DAVIS and L A RIEHL on their Experience with Powders in the Control of Typhus in Italy, 1943 to 1945. These workers were members of the Rockefeller Foundation Typhus Team, and after experiments in Egypt early in 1943, which proved that insecticide powders could be used with success for mass delousing of clothing, they went on in July, 1943 to test MYL and DDT powders at the Maison Carrée Prison, Algiers, where they found that the powders could be satisfactorily applied with hand dusters or compressed-air units without removing the clothing from the body. They state that this work was very important since it was the basis of the proposal, made in the initial discussion with the Military Government Section of the A I H Q, to undertake control of typhus fever in occupied Italy with louse powder alone. This proposal was put into effect with startling success in Naples in December, 1943, and although vaccination was also adopted in January, 1944, this came too late to have any significant influence on the course of the epidemic. The authors emphasize the ease with which louse infestation, and so typhus transmission, can be controlled in this way.

of formalized horse-serum produced a reduction in the rickettsia-agglutination titre of the fluid by about one-half

John H. D. Meyer

URGENT Ed., BÉGUTY M., PARROT L. & HORRENEFENGER R. La prophylaxie du typhus exanthématique en temps d'épidémie et dans les périodes inter-épidémiques en Algérie [The Prevention of Exanthematic Typhus in Epidemic and Interepidemic Periods.] *Arch. Inst. Pasteur d'Algérie* 1949 Mar. v. 27 No. 1 1-8.

The authors were associated with the field experiment which formed the basis of the successful control of the famous Naples epidemic of 1943-44. They mention the trials of MYL and DDT carried out in collaboration with the Rockefeller Foundation team headed by F. L. SORRE at the Maison Carrée prison and in a rural area near Algiers during the first half of 1943 and state that "The Pasteur Institute of Algeria conceived the idea (major) of blowing the powder under the clothing."

The methods recommended in Algeria are (1) During epidemics vaccination with killed vaccines and dusting all persons exposed to risk of infection, employing insecticide powders, and (2) During interepidemic periods the yearly vaccination of the inhabitants of endemic areas, without using insecticide powders. The omission of dusting except during epidemics is presumably based on the principle of making the best use of the available staff and materials apart from this consideration it would appear advisable to maintain low control at all times in endemic areas.

Vaccination with a single dose of the killed vaccine of Durand and Giroud is recommended. It is carried out simultaneously with smallpox vaccination and antituberculous inoculation with B.C.G. so that the health staff can deal with the prevention of three great diseases at the same time. (See also this Bulletin 1949 v. 48 539)

John H. D. Meyer

CHAUDHURI R. N. & CHAKRAVARTI H. Typhus in Calcutta. *Ind. J. Med. Gaz.* 1949 Feb. v. 84 No. 2, 43-51 3 figs. [15 refs.]

The author gives a good clinical description of 25 cases of "typhus fever" studied in a Calcutta hospital during the previous 37 months. Four of the cases were diagnosed as murine typhus (OX19) and 21 as mite typhus (OXh). There were two deaths. The patients were closely observed and the clinical features as described were in keeping with the diagnosis of fevers of the typhus group. Two of the patients had eschars, seven had enlarged glands in the neck. The white-cell count was usually within normal limits. There was hypoproteinaemia in most of the cases, the defect being in the albumin fraction.

Among the cases of the OXh type, one gave a negative reaction in each of four weekly Weil-Felix tests, though rickettsiae were recovered from the blood. This was a case of laboratory infection resulting from the bite by a mouse which was being inoculated with a typhus emulsion. There was a whitish-like eschar at the site of the bite.

In the other OXh cases titres 1:100 to 1:1,800 were observed

John H. D. Meyer

BRICEÑO-IRAGORRY L. Estudio sobre 4,203 reacciones d Weil-Felix en sujetos d febricitantes de la zona de Caracas. Study of 4,203 Weil-Felix Reactions in Cases of Fever in the Caracas Area. *Rev. Sanidad y Asistencia Social* Caracas, 1945 Apr. 10 No. 3 p. 17.

The 4,203 sera were from persons suspected of having typhoid fever. During the five-year period, 1940-1944 in which the tests were carried out 41 cases of

murine typhus were diagnosed by the reaction, these are discussed separately. The sera were tested first by a rapid slide method and the positives were further tested by the standard method.

The number of sera reacting with *Proteus OX19* at titres of 1-40 or over was 365 (8.4 per cent). Reactions at titres of 1-160 and 1-320 are specially discussed. There were 31 (0.73 per cent) at the former titre and 25 of these also reacted at titres of 1-40 to 1-320 against an O strain of typhoid bacilli, leaving only six cases in which the Weil-Felix reaction could not be explained either as a para-agglutination in cases of typhoid fever or as a typhus reaction. In all the 7 cases in which the titre was 1-320 the Widal reaction was also positive at titres of 1-160 to 1-320, and the diagnosis of typhoid fever was established so the Weil-Felix reactions were regarded as para-agglutinations.

In the 41 cases of murine typhus already mentioned the Weil-Felix titres ranged from 1-200 to 1-10,000, and only one gave a positive Widal reaction against an O strain, of typhoid, and that was at a titre of 1-40. There were a few reactions against an H strain, against paratyphoid B and C, but never at a titre higher than 1-80.

The conclusions reached were—(1) Weil-Felix titres of 1-80 or less have no diagnostic significance unless the titre is found to be rising, (2) A titre of 1-160 in the absence of a positive Widal reaction is suspicious and calls for further investigation, (3) A titre of 1-320, unless accompanied by a positive Widal reaction, is regarded as diagnostic, (4) In typhus fever there is little tendency to the development of typhoid agglutinins, whereas in typhoid fever there may be a pronounced tendency to the production of agglutinins against *Proteus OX19*.

[The last conclusion is contrary to the experience of most of the other workers on the subject.]

John W D Megaw

VARELA, G, PÉREZ-REBELO, R, ROCH, E & OLARTE, J. Exploración de tifo en ratas de la ciudad de Mexico, por medio de la fijación del complemento con rickettsias y aglutinación con *Proteus OX19* [Survey of the Prevalence of Typhus Infection of Rats in Mexico City, by Complement-Fixation and Weil-Felix Tests] *Rev Inst Salubridad y Enfermedades Trop* Mexico 1948, June, v 9, No 2, 139-44. English summary.

Complement-fixation tests, with the use of murine antigen, were carried out on 1,376 rats trapped in Mexico City between March and September, 1948. In 9.7 per cent of these, positive results were observed. In most cases the reactions with epidemic antigen were also positive, but always at titres of one-half or less when compared with the reactions against murine antigen.

In another series of 1,157 rats Weil-Felix tests were carried out. Against *Proteus OX19* there were 12.2 per cent of positives, and in about one-third of these there were positive reactions against *Pr OXK* or *Pr OX2* or both. Against *Pr OXK*, 7.9 per cent of the rats gave positive reactions and against *Pr OX2*, 3.5 per cent reacted, in both of these groups about one-half of the reacting animals were positive also with one or both of the other *Proteus* strains. Altogether 18.7 per cent of the rats agglutinated one or more *Proteus* strains at titres of 1-80 or over.

John W D Megaw

KRISHNAN, K V, SMITH, R. O A, BOSE, P N, NEOGY, K N, ROY, B K G & GHOSH, M. Clinical Features and Laboratory Diagnosis of XK or Mite-borne Typhus as observed in 102 Cases in the Barrackpore Area. *Indian Med Gaz* 1949, Feb, v 84, No 2, 33-9, 3 charts.

This is the first of a series of four papers by the Bengal Typhus Enquiry team, based on the All India Institute of Hygiene, Calcutta.

During the years 1946-48 102 cases occurring at Barrackpore near Calcutta were diagnosed as "typhus fever". The case-fatality rate was 3.0 per cent.

In 64 of the cases the diagnosis was confirmed by the Weil-Felix test and by isolation of rickettsiae from inoculated animals. Serologically 72 per cent. of the cases were of the XK type 19 per cent were of the X19 (murine) type and 9.0 per cent of the X₂ type.

It was not possible to differentiate the three serological types on clinical grounds. A description is given of the clinical features of the XK cases. 80 per cent. of these were mild and no eschar was detected in any of them. 20 per cent. were severe. In 5 of them there was an eschar. A rash was seen in 7.0 per cent. of the mild cases, and in 75 per cent. of the severe. In the mild cases the diagnosis of a typhus-group fever was usually impossible on purely clinical grounds.

In the X19 cases the Weil-Felix titre always rose to 150 or over but guinea pig inoculation carried out in some of the cases never caused a Neill-Moser reaction.

In the XK cases the Weil-Felix reaction was completely positive in 10 per cent. It reached titres of only 125 or 1-50 in 25 per cent. in 63 per cent. the titre was 1/100 or over.

There were 7 cases of the X₂ type all of which had titres of 1/125 or over and all reacted also with OXK or OX19 at titres of 1/25 or 1-50. The authors rightly suggest that this type needs to be properly investigated, especially as animal inoculation has not been very helpful.

Washed blood cells from the XK cases were used for the inoculation of white mice in which ascites always occurred in the positive cases whereas "by no other strain studied was it caused". Inoculated mice when positive always yielded viable rickettsiae from peritoneal scrapings taken about the 8th day.

Mice inoculated with the blood of one of the X₂ patients reacted in the same way as those inoculated from XK patients so that this strain was assumed to be one of XK and not of X₂ whereas blood of another X₂ patient caused an apparent infection in a mouse and guinea pig but a strain of rickettsia was isolated by subinoculation with spleen and brain material, and this was subsequently passed through guinea pigs. The comment made is that this strain may be considered to be an X₂ strain of this area.

Suitable antigens were not available for complement fixation tests which, however, were not regarded as being very necessary except in connexion with the X₂ cases.

[Few workers on the typhus fevers would regard the complement fixation tests as superfluous in such conditions. It would be easy to submit sera from one of the American laboratories specializing in the test.]

In view of their own findings it is surprising that the authors lay stress to such lengths in their attempt to correlate the classification based on the Weil-Felix response with the recognized classifications. The OX19 type includes not only louse-borne and flea-borne typhus but also many cases of tick-borne typhus. 35 per cent. of the present cases had XK type and did not give significant reactions with Proteus OXK and one case giving an X₂ reaction is said really to belong to the XK group. Boyd who first employed the classification based on the Weil-Felix response never claimed any significance for this except as a statement of the fact that sera from various parts of India gave certain responses and he was not classifying the types of disease but only the types of reaction.

John B. D. Meyer

KRISHNAN, K V, SMITH R O A, BOSE, P N, NEOGY, K N, ROY, B K G & GHOSH, M The Breeding and Maintenance of *Trombicula deliensis* in the Laboratory for Experimental Purposes *Indian Med Gaz* 1949, Feb, v 84, No 2, 39-41, 1 pl

This paper will be read with great interest by all workers on the vectors of mite-borne typhus. The authors are to be congratulated on their remarkable success in breeding *Trombicula deliensis* in the laboratory.

Ingenious methods are described by which three complete generations of the mites have been reared starting from a colony collected from local rats.

A few mites collected in June 1948 were still alive and breeding five months later. A brief description of all the stages in the life cycle is given, and is illustrated by an excellent plate showing photomicrographs of each stage. In the following list of the stages the approximate duration of each, in the conditions described, is shown in brackets. Egg (7 days), deutovum (7 days), larva (3-5 days), nymphochrysalis (7 days), nymph (7-14 days), imago-chrysalis (7 days), and adult.

The special importance of this study is that for the first time it places at the disposal of other workers a method of obtaining laboratory-bred mites in sufficient numbers for employment in transmission experiments.

The initial success in rearing the larval mites was due to the adoption of the method used by WHARTON and CARVER who fed nymphs of *Neoschöngastia* mites on insect eggs [see this *Bulletin*, 1946, v 43, 1079]. For details of the authors' methods the original paper must be consulted.

John W D Megaw

KRISHNAN, K V, SMITH, R O A, BOSE, P N, NEOGY, K N, ROY, B K G & GHOSH, M Transmission of *Rickettsia orientalis* by the Bite of the Larvae of *Trombicula deliensis* *Indian Med Gaz* 1949, Feb, v 84, No 2, 41-3

As a happy sequel to their success in breeding mites in the laboratory, the authors are now able to report that they have transmitted *Rickettsia orientalis* from mouse to mouse in the laboratory by the bites of larval *Trombicula deliensis* which were the progeny of larvae infected by feeding on infected mice.

Five of the eight mice on which infected larvae had fed became infected, the infection was inapparent but was demonstrated by the recovery of strains from mice inoculated with brain suspensions of the fed mice.

The three mice which did not become infected had been bitten by 11 to 30 larvae, in the successful cases the mice had been bitten by 38 to 78 larvae. No natural infection could be detected in any mice of the strain used in the above experiments.

The paper contains a hint that experiments on the transmission of infection to human volunteers may be contemplated by the authors.

John W D Megaw

KRISHNAN, K V, SMITH, R O A, BOSE, P N, NEOGY, K N, ROY, B K G & GHOSH, M Epidemiological Observations on XK or Mite-borne Typhus in Barrackpore, Bengal *Indian Med Gaz* 1949, Feb, v 84, No 2, 63-8, 3 charts [12 refs]

This is a description of the epidemiological features of the fevers of the typhus group in Barrackpore, a cantonment town near Calcutta.

The disease was most prevalent during the rainy season, May to October, this was also the season of greatest abundance of *Trombicula deliensis*.

Most of the persons affected were workers or campers in the scrub jungle or fields. *T. deliensis* mites were found in large numbers on 74 per cent. of the local *Rattus* spp. and 20 per cent. of the highly infested rats were found infected with *Rickettsia orientalis*.

(The authors mention the case of laboratory infection described in the preceding paper by CHAUDHURI *et al.* (above) and state that the blood showed agglutinins for O.K. this is probably a mistake because the physicians in charge show the reaction as having been negative in tests made during each of the four weeks of the illness and they add that this result shows "the unreliability of this non-specific test.")

John W. D. Brown

BROWNING, H. C. & HALRA, S. L. Scrub Typhus subsequent to "Fulton" Vaccine and Investigation of the Infected Area. *J. Surv. J. Med. Res.* 1949 Oct. v. 38 No. 4 279-80.

The greater part of this paper consists of a description of an epidemiological survey of an infected site at Palei in the Manipur State situated between Assam and Burma. There were 17 cases, one of which was fatal, of scrub typhus among 261 members of a Pioneer Force camped on the site during the months July to September 1943. The survey was carried out during the months September to November of the same year. It is a good example of the kind of investigation found by experience to be most suitable in suspected areas. Rats in cages were placed at different points as baits for larval mites, soil samples were searched, local rodents and other animals were captured and tested for infection by mouse inoculation.

Four strains of the rickettsia of scrub typhus were recovered from rats (a variety of *Rattus* spp.); three of the strains were recovered from the blood of the rats. One strain was recovered from four *Hydromys* *lamarum*, one strain from the only tree shrew (*Tupaia belangeri belangeri*) which was examined, and one strain from one of the twelve specimens of field mice caught in the area. Four strains were recovered from 70 batches of mites collected from rats and one strain from a mite found attached to a patient. *Trombicula deliensis* was the only species of mite present in all the batches from which infection was isolated. A strain was recovered from the blood of one of the authors (H. C. Browning) whose attack is described in detail.

A different species of rickettsia was recovered from ticks (*Haemaphysalis* *leachi*); this strain was found to be immunologically identical with the rickettsia of Rocky Mountain spotted fever but its virulence for guinea-pigs was very low. This is a significant observation: it shows that immunologically identical rickettsia of tick-borne typhus may differ sharply in their virulence for guinea-pigs.

The attack from which one of the authors suffered is of special interest because the patient had received three doses of the "Fulton" vaccine four-and-a-half months before the onset: the attack must have been severe: there was delirium and incoherence of speech for several days; the fever lasted 13 days and there were minor rises of temperature on the 15th and 16th days. Serum taken on the 19th day was sent to Dr. Toppeng at Bethesda U.S.A. and was reported as having a complement fixation titre of 1:51 against harp antigen, and a titre of 1:32 against Gullman antigen. The strain isolated from the patient gave complete cross-immunity with the other strains of *P. tularum* isolated in the area. The authors conclude that the course of the disease had not been modified by vaccination but they believe that the other evidence available on the subject suggests that the vaccine has some protective value though this is short-lived so that it is inadvisable to give

the advice of FULTON and JOYNER [this *Bulletin*, 1946, v 43, 435] who recommend that "booster" doses should be given every three months

The authors also recommend that in view of the immunological differences found to exist between strains from different areas vaccines should be polyvalent

The only precaution taken by the patient while working in the infected area was a daily hot bath with soaping and scrubbing of the skin within two hours of each visit to the suspected site. The authors' comment is that either this treatment does not remove attached mites, or mite attachment for less than six hours can convey infection, or mites remain on the clothing for two to six hours and then can attack

John W D Megaw

KOUWENAAR, W & ESSEVELD, H **The Nature of Immunity against Scrub Typhus in Guinea-Pigs** *Documenta Neerlandica et Indonesica de Morbis Tropicis* Amsterdam 1949, Mar, v 1, No 1, 34-40 [34 refs]

In a large series of experiments carried out in North Sumatra, the authors found that guineapigs convalescent from infection with 14 different strains of *R orientalis* remained immune against challenge with homologous or heterologous strains for long periods, in one case up to 708 days

Only one strain, isolated in Sumatra, differed from the others in failing to immunize against the other strains. The authors refer to the findings by BENGTON [this *Bulletin*, 1945, v 43, 551] and other workers of differences in the antigenic structure of various strains of *R orientalis*

Attempts to demonstrate the presence of protective antibodies in the sera of convalescent patients and guineapigs gave unsatisfactory results, large daily injections of the sera, started one or two days before inoculation, failed to modify the illness in guineapigs. When infected material was mixed with the serum before inoculation the fatality rate was 49 per cent, with similar doses mixed with normal serum it was 72 per cent, so there seemed to be some attenuation of the virulence of the infection

The persistence of viable rickettsiae in the recovered guineapigs was most easily demonstrable by inoculation with spleen substance, second best was blood, but brain, testicular tissue, and urine, gave more negative than positive results in the tests carried out 26 or more days after the end of the fever

The immunity is believed to be an "infection immunity" of the type described by SERGENT [*prémunition*]. The relatively brief immunity observed in man and monkeys is believed to be associated with the disappearance of rickettsiae from their bodies soon after recovery from the illness

John W D Megaw

UNITED PLANTING ASSOCIATION OF MALAYA **Scrub Typhus and its Prevention**
Prepared by the Scrub Typhus Research Unit at the Institute for Medical Research at the Request of the United Planting Association of Malaya
8 pp Kuala Lumpur

This pamphlet of eight pages was prepared by the Scrub Typhus Research Unit at Kuala Lumpur at the request of the United Planting Association of Malaya. It is a model of what such a pamphlet ought to be, containing as it does in simple language what every layman in Malaya needs to know and needs to do in connexion with the prevention of scrub typhus

The nature and manner of infection are described and the reader is told how to recognize the vectors by finding them as reddish or orange-coloured specks in the ears of infested rats. The harmless mites are described as being white or yellowish, and the mites that cause scrub itch in Malaya as bright scarlet in colour. As a rule of thumb it is advised that if half or more of the

rat trapped in an area are found infested steps must be taken to deal with the area in consultation with the officers of the Research Unit.

A point of interest is the statement that the available supply of chloromycetin is so small that the drug can be used only for the very urgent cases. It is also stated that the supply of vaccine produced as a wartime emergency measure is exhausted.

The chief measures of prevention mentioned are the treatment of clothing with dibutyl phthalate spraying dangerous areas marked down for clearance on the following day with crude oil at the rate of 40 gallons to the acre smearing the legs of labourers with the same oil and employing labourers who have already had an attack of the disease. Gammaxene applied as a dust at the rate of one pound to the acre is said to be "probably an effective agent" which however should not be applied without expert advice.

Warning is given that rat destruction should not be employed for the immediate control of infection though it is valuable as a long term policy.

John W. D. Meakin

ANDERSON J. R. Some Ecological Effects of Deforestation and Settlement. Reprinted from *Malayan Nature J.* 1948 Dec., v. 8, No. 4 178-89 3 figs.

This paper is of chief interest to naturalists, but it contains a significant reference to the special risk of scrub-typhus infection in the fringe habitats which are narrow zones at the periphery of forest clearings and which provide a combination of conditions favourable to the fauna of the forest as well as of the clearings. Hence the richness of the fringe habitats in the hosts of the mite vectors of scrub typhus.

John W. D. Meakin

HARRELL G. T. & AIKAWA J. K. Pathogenesis of Circulatory Failure in Rocky Mountain Spotted Fever. Alterations in the Blood Volume and the Thiocyanate Space at various Stages of the Disease. *Arch. Intern. Med.* 1949 Mar. v. 83 No. 3 331-47 13 figs. (Refs. in footnotes).

Systematic studies by biochemical and other methods were carried out in 13 cases of Rocky Mountain spotted fever, all of whom were given supportive treatment. In six of the cases antiserum or para-aminobenzoic acid or both were also given. The paper is illustrated by a set of elaborate charts showing the changes occurring in such features as pulse rate, blood pressure, plasma volume, thiocyanate space, total serum protein, serum albumin, etc.

The authors discuss the findings in each case. Some of the conclusions reached were—There is an increased permeability of the capillaries, especially during the second week of the rash. This is believed to be associated with the antigen-antibody reaction in the course of which histamine like body is produced causing an escape of fluid and proteins from the blood to the cells and tissues of the body and oedema. The maintenance of circulating proteins by feeding on a high protein diet is recommended in preference to transfusion. In two cases the unnecessary parenteral administration of serum, plasma or plasma caused an increase in plasma volume and myocardial circulatory failure.

The administration of para-aminobenzoic acid or antiserum did not prevent circulatory changes. The excessive administration of fluid may precipitate myocardial failure.

The general impression conveyed to the reader is that indiscriminate parenteral treatment is more likely to do harm than good and that patients who are given a generous diet well supplied with high-grade protein will rarely need transfusions of serum, plasma or whole blood. The authors

warning against giving excessive amounts of fluid should not deter physicians from giving adequate quantities, especially in the early stages of the illness

John W D Megaw

HARDY, S M A Review of Preliminary Clinical Studies on Aureomycin, a New Antibiotic Agent *Bol Asoc Med de Puerto Rico* 1948, Dec, v 40, No 12, 347-50 [14 refs]

This is a review of 14 papers (of which 9 are said to be "in the press" or "to be published") dealing with aureomycin. The drug is said to be particularly indicated in (1) the rickettsial diseases—tick fever, typhus, lymphopathia venereum, Q fever, psittacosis, ornithosis, and certain bacterial and viral eye infections [this is the author's classification], (2) primary atypical pneumonia, (3) genito-urinary tract infections due to penicillin-fast or streptomycin-fast organisms, (4) acute and chronic brucellosis, (5) streptococcus or staphylococcus or pneumococcus infections, especially those resistant to penicillin or streptomycin.

The usual method of administration is by the mouth, in doses of 25-100 mgm per kgm daily, for five to fourteen days. Parenteral injections are reserved for fulminating infections, the dose recommended is 2-10 mgm per kgm daily, but this "may be too low."

Verbal reports of two cases of death attributed to treatment are mentioned, one was apparently due to anaphylactic reaction after intravenous treatment, the other was with "an allegedly Hersheimer type of reaction" in a case of brucellosis.

John W D Megaw

ANIGSTEIN, L, WHITNEY, Dorothy M & BENINSON, J Aureomycin Protective Effect in Experimental Rocky Mountain Spotted Fever and Typhus with particular reference to Intermittent Treatment *Texas Reports on Biol & Med* 1949, v 7, No 1, 96-110

By a series of experiments on guineapigs inoculated intraperitoneally with *Rickettsia rickettsi* the authors have confirmed the findings already reported by WONG and COX (*Ann New York Acad Sci*, 1948, v 51, 290) and other workers, including themselves, with regard to the powerful anti-rickettsial action of aureomycin.

In the present experiments it was found that intermittent treatment with doses of 10 to 30 gm of the drug given every two or three days gave as good results as similar doses given daily. The intermittent treatment had less effect in preventing the development of high complement-fixation titres in the animals and so presumably interfered less with the production of immunity, but the recovered guineapigs were found immune when challenged with homologous rickettsiae even when the intermittent dosage had not been sufficient to cause complete suppression of the signs of infection.

John W D Megaw

DE MAGALHÃES, O & ROCHA, A Subsídio ao melhor conhecimento do tifo exantemático neotrópico no Brasil. Presença do vírus no leite [Contribution to the Better Knowledge of the Neotropical Typhus of Brazil] *Mem Inst Oswaldo Cruz* 1948, Mar, v 46, No 1, 269-83, 3 figs. English summary

The authors state that they have demonstrated the presence of the "virus of exanthematic neotropical typhus" [presumably *Rickettsia rickettsi*] in the milk of a goat which, three days previously, had been inoculated intraperitoneally with a strain of the infection. The only sign of disease in the goat itself was a positive group reaction with the Weil-Felix test. The goat had been

strain which was transferred first to a rabbit or mouse then to a human volunteer and finally to mice which became severely affected. The virus has been maintained by serial passage through mice for four years.

A number of persons received three doses of the vaccine before migrating to infected areas in the Far East—the presence of immune bodies in the sera of the immunized persons was shown by mouse-protection tests. One of 6 vaccinated persons who went to Sumatra had a slight symptom of dengue three months later—the others remained free from symptoms although a dengue "endemic" occurred among non-immunized persons. In New Guinea a number of non-immunized persons contracted typical dengue during three months of residence but none of the ten immunized was attacked.

The evidence of the production of a worthwhile immunity is not convincing
John W. D. Meqar

RABIES

JAUJOU L'Infection rabique en Corse au cours de l'année 1946. [Rabies in Corsica during 1946.] *Bull. de l'Ass. Méd. 1948* v. 132, Nos. 7-8, 128.

The epidemic of animal rabies described in this paper occurred in Corsica, from which the disease had been absent since 1872. Introduced by dogs accompanying soldiers, who had crossed from North Africa where rabies is endemic, the infection appeared first between April and October in 1944, reappeared in April 1945 and, after remaining latent for some months, flared up and spread rapidly until the end of 1946. All kind of livestock were involved in the epidemic, the infection of domestic animals having been largely due to the bites of foxes, among which the disease was extremely prevalent. The epidemic affected at least one-half of the island territory and losses among livestock were heavy. Diagnosis was established by histological examination and experimental animal inoculation of material recovered from domestic animals dead of the disease. The virus is stated to have been identical with the North African strain. Although the epidemic was confined to the animal population, 167 persons presented themselves for anti-rabies treatment—171 at the emergency treatment centre established at Ajaccio where phenolized vaccine was employed and 46 at continental Pasteur Institutes. No case of human rabies was reported, no ill effects of treatment occurred.

Measures of control included prophylactic vaccination of dogs and herbivorous animals, the restricted movement of dogs and the destruction of foxes by shooting, trapping or poisoned bait. Doubt is expressed as to whether the infection has actually been extinguished.

(An epizootic among foxes has troubled the South-Eastern States of the U.S.A. for some years.)
C. Stuart

RIÉGOTON R., LAMY R., VIALAT C., BESSARD A. Contribution à l'étude de la rage. I. De la virulence de la rage fixe par voie sous-cutanée après addition de bave de chien normal. [RÉGOTON, LAMY & VIALAT.]

Contribution to the Study of Rabies. I. On the Virulence of Fixed Virus administered subcutaneously after the Addition of Healthy Dog's Saliva. *Amer. J. Hyg.* 1949 Mar v. 78 No. 3, 281-5. II. De la virulence de la rage fixe par voie sous-cutanée après addition de hyaluronidase. [RÉGOTON, BESSARD & VIALAT.] On the Virulence of Fixed Virus administered subcutaneously after the Addition of Hyaluronidase. *Ibid.* 285-6.

In the first of the articles under review the authors describe an experiment carried out with a view to determining whether or not the rôle played by it

saliva of a biting animal is purely a mechanical one. For the experiment, saliva was obtained from a healthy dog previously injected with pilocarpine and the fixed virus from the PASTEUR strain at its 1809th passage—a strain which had long lost its power of transmission by the subcutaneous route. To an emulsion of 1 : 10 by weight of this fixed virus was added an equal volume of saliva, the mixture being placed in the incubator for 1 hour at 22°C.

To each of 4 guineapigs 1 cc of the mixture was administered subcutaneously in the flank on 1st December 1948 and on the same date each of 4 control guineapigs received in the same region 1 cc of the mixture which, in this case, had not been kept in the incubator.

Of the first group, one developed typical paralysis on 9th December and was sacrificed, when at the point of death, on the 16th December. A second became paralysed on the 15th December and was sacrificed on the following day. The third and fourth animals escaped infection. Of the second group, none was affected. What factor was responsible for the alteration in behaviour of the fixed virus? In the authors' opinion it was an enzyme, not amylase (as proved by previous investigation), but probably hyaluronidase, their belief being based on the findings of DURAN REYNALS (*C R Soc Biol*, 1928, v 99, 6) and of HOFFMAN (*J Exper Med*, 1931, v 53, 43), who had some 20 years ago demonstrated the influence of that enzyme as a "spreading factor" on a number of viruses.

In the second article the authors describe how, using hyaluronidase obtained from testicular extract of the bull, they were able to effect a change in the behaviour of the fixed virus when injected subcutaneously into guineapigs identical to that obtained with the saliva of a healthy dog. Thus the belief expressed in their first article received strong support.

It is of interest to note that, in the guineapigs sacrificed in the first series of experiments histological examination of the neural axis showed not only lesions typical of fixed virus rabies but also, at the level of the neurones in the outer layer of Ammon's horn, nuclear lesions of a type unknown to the authors. There was frequent occurrence, in the same nucleus, of 2 nucleoli in every way comparable, but most marked was the presence, in nuclei still retaining their normal arrangement of chromatin, of oxyphilic bodies, like the nucleoli, varying in dimension up to the size of nucleoli and attached thereto in twos and threes. Such bodies, arranged symmetrically when small, tended to take up a position further from the nucleolus in proportion to their increase in size and to approach the inner coat of the nuclear membrane, a clear halo surrounding those of larger size. None of these formations was observed in the cytoplasm of the neurones. Similar findings were encountered in the second series of experiments.

G Stuart

LIEOU Y C. Carriers of Rabies Virus. *Chinese Med J* 1948, Dec, v 66, No 12 694-9 [33 refs]

The author defines a carrier of rabies virus as "one who with all the external signs of good health bears nevertheless, in his organism a virus detectable either by experimental inoculation or by microscopical examination". He divides carriers into four categories according to localization of virus, viz, in the brain, blood, saliva and subcutaneous tissues. The following paragraphs summarize his presentation of the subject—

Virus carried in the brain—Experimentally virus, after intracerebral inoculation may be latent unaltered and without causing symptoms for long periods (90-302 days respectively) in the brain of the fresh water turtle

strain which was transferred first to a rabbit, then to a human volunteer and finally to mice which became severely affected. The virus has been maintained by serial passage through mice for four years.

A number of persons received three doses of the vaccine before migrating to infected areas in the Far East. The presence of immune bodies in the sera of the immunized persons was shown by mouse-protection tests. One of five vaccinated persons who went to Sumatra had a slight symptom of dengue three months later; the others remained free from symptoms although a dengue epidemic occurred among non-immunized persons. In New Guinea a number of non-immunized persons contracted typical dengue during three months of residence but none of the ten immunized was attacked.

The evidence of the production of a worthwhile immunity is not convincing.
John W. D. Meager

RABIES

JACQUET. L'infection rabique en Corse au cours de l'année 1946. [Rabies in Corsica during 1946.] *Bull Acad Nat Med* 1949 v 132, No. 78, 128.

The epidemic of animal rabies described in this paper occurred in Corsica from which the disease had been absent since 1832. Introduced by dogs accompanying soldiers who had crossed from North Africa where rabies is endemic, the infection appeared first between April and October in 1944, reappeared in April 1945 and after remaining latent for some months flared up and spread rapidly until the end of 1946. All kinds of livestock were involved in the epidemic, the infection of domestic animals having been largely due to the bites of foxes among which the disease was extremely prevalent. The epidemic affected at least one half of the island territory and losses among livestock were heavy. Diagnosis was established by histological examination and experimental animal inoculation of material recovered from domestic animals dead of the disease. The virus is stated to have been identical with the North African strain. Although the epidemic was confined to the animal population 167 persons presented themselves for anti-rabies treatment—171 at the emergency treatment centre established at Ajaccio where phenolized vaccine was employed and 46 at continental Pasteur Institutes. No case of human rabies was reported, no ill effects of treatment occurred.

Measures of control included prophylactic vaccination of dogs and herbivorous animals, the restricted movement of dogs and the destruction of foxes by shooting, trapping or poisoned bait. Doubt is expressed as to whether the infection has actually been extinguished.

[An epizootic among foxes has troubled the South-Eastern States of the U.S.A. for some years.]
C. Stuart

RIQUENON R., LAMY R., VIALAT C., BUSQUET A. Contribution à l'étude de la rage. I. De la virulence de la rage fixe par voie sous-cutanée après addition de base de chien normal. [BÉQUIGON, LAMY & VIALAT. Contribution to the Study of Rabies. I. On the Virulence of Fixed Virus administered subcutaneously after the Addition of Healthy Dog's Saliva.] *Ann Inst Pasteur* 1949 Mar v 78 No 3, 220-5. II. De la virulence de la rage fixe par voie sous-cutanée après addition de hyaluronidase. [RIQUENON, BESSARD & VIALAT. On the Virulence of Fixed Virus administered subcutaneously after the Addition of Hyaluronidase.] *Ibid* 225-8.

In the first of the articles under review the authors describe an experiment carried out with a view to determining whether or not the role played by the

saliva of a biting animal is purely a mechanical one. For the experiment, saliva was obtained from a healthy dog previously injected with pilocarpine and the fixed virus from the PASTEUR strain at its 1809th passage—a strain which had long lost its power of transmission by the subcutaneous route. To an emulsion of 1 : 10 by weight of this fixed virus was added an equal volume of saliva, the mixture being placed in the incubator for 1 hour at 22°C.

To each of 4 guineapigs 1 cc. of the mixture was administered subcutaneously in the flank on 1st December 1948 and on the same date each of 4 control guineapigs received in the same region 1 cc. of the mixture which, in this case, had not been kept in the incubator.

Of the first group, one developed typical paralysis on 9th December and was sacrificed, when at the point of death, on the 16th December. A second became paralysed on the 15th December and was sacrificed on the following day. The third and fourth animals escaped infection. Of the second group, none was affected. What factor was responsible for the alteration in behaviour of the fixed virus? In the authors' opinion it was an enzyme, not amylase (as proved by previous investigation), but probably hyaluronidase, their belief being based on the findings of DURAN REYNALS (*C. R. Soc. Biol.*, 1928, v. 99, 6) and of HOFFMAN (*J. Exper. Med.*, 1931, v. 53, 43), who had some 20 years ago demonstrated the influence of that enzyme as a "spreading factor" on a number of viruses.

In the second article the authors describe how, using hyaluronidase obtained from testicular extract of the bull, they were able to effect a change in the behaviour of the fixed virus when injected subcutaneously into guineapigs identical to that obtained with the saliva of a healthy dog. Thus the belief expressed in their first article received strong support.

It is of interest to note that, in the guineapigs sacrificed in the first series of experiments, histological examination of the neural axis showed not only lesions typical of fixed virus rabies but also, at the level of the neurones in the outer layer of Ammon's horn, nuclear lesions of a type unknown to the authors. There was frequent occurrence, in the same nucleus, of 2 nucleoli in every way comparable, but most marked was the presence, in nuclei still retaining their normal arrangement of chromatin, of oxyphilic bodies, like the nucleoli, varying in dimension up to the size of nucleoli and attached thereto in twos and threes. Such bodies, arranged symmetrically when small, tended to take up a position further from the nucleolus in proportion to their increase in size and to approach the inner coat of the nuclear membrane, a clear halo surrounding those of larger size. None of these formations was observed in the cytoplasm of the neurones. Similar findings were encountered in the second series of experiments.

G. Stuart

LIEOU Y. C. Carriers of Rabies Virus. *Chinese Med. J.* 1948, Dec., v. 66, No 12, 694-9 [33 refs.]

The author defines a carrier of rabies virus as "one who, with all the external signs of good health bears, nevertheless in his organism a virus, detectable either by experimental inoculation or by microscopical examination". He divides carriers into four categories according to localization of virus, viz., in the brain, blood, saliva and subcutaneous tissues. The following paragraphs summarize his presentation of the subject—

Virus carried in the brain—Experimentally virus after intracerebral inoculation may be latent, unaltered and without causing symptoms for long periods (90-302 days respectively) in the brain of the fresh water turtle

Clinical observations made on 12 women, of from 15 to 48 years of age, revealed a continuous stimulation of the ovary both during and after anti-rabies treatment—a stimulation evidenced by marked irregularity of menstruation. It was found that the more the treatment was prolonged, the greater was the degree of disturbance—thus one woman treated over a period of 25 days twice experienced the menstrual flow during that time. The authors conclude therefore that anti-rabies treatment produces a disturbance of ovarian function.

G. Stuart

ROANTREE W. B. *Surgical Treatment of Rabies.* (Memoranda.) *Brit. Med. J.* 1949 May 21 800

Complete destruction of rabies virus in wounds by cauterization alone is at best fortuitous and unlikely to occur in extensive deep or punctured wounds. The author, writing from Kolar Gold Field, India, quotes three fatal cases, in two of which cauterization had been employed—but he admits that the risk of rabies had been great. The patients had also had full, but somewhat delayed courses of anti-rabies vaccine.

He suggests that cauterization might well be combined with the modern surgical technique of excision of contaminated wounds—he briefly outlines such a treatment which consists principally of the following steps:

(1) Thorough cauterization immediately with concentrated nitric or pure carbolic acid.

(2) Careful sterilization of the skin over a wide area with pure rectified spirit and then with tincture of iodine.

(3) Surgical excision en bloc of all lacerated and potentially infected tissue. Dissection should be made in uncontaminated tissue planes with an ample barrier of clear tissue. A fresh knife is necessary for each wound, contaminated instruments should be kept rigidly separate and the tool with lyso, washed and sterilized at the earliest moment.

(4) The surgical wound is cauterized with the original cauterizing agent. After haemostasis is secured it is left unsutured and dressed.

Dr N. Veeraraghavan, Director of the Pasteur Institute, Coimbatore, pointed out to the author that in experimental animals, rabies occurs as quickly by inoculation of the sciatic nerve as of the subdural space. He raised the question of such inoculation of nerve trunks during surgical excision of the wound; the present author believes it to be likely that this could be avoided by immediate cauterization and careful avoidance of operative contamination.

He suggests that there is ground for testing this procedure experimentally. If it proved effective the method would be indicated in cases where (1) strong presumptive evidence of rabies infection was present, (2) wounds were amenable to radical excision, (3) adequate surgical facilities were available.

In more remote areas, cauterization alone would of course be necessary for local treatment—and in any case a full course of anti-rabies vaccine would be required.

H. J. O'D. Bush-Gaffney

WRIGHT, J. T., BELL, J. F. & HARVEY, R. Benzene-Ether Extracted Rabies Vaccine. *Science* 1949, July 30 118 19

Believing that their previous estimate of sharp separation of the rabies virus from tissue component had been largely frustrated by the presence of brain lipoids, the authors, as a initial step in the purification of rabies vaccine, attempted the preparation of vaccines by extracting these lipoids with aromatic solvents (acetone, benzene, carbon tetrachloride, diethyl ether). The technique followed may be thus summarized: The homogenized, infected,

brain tissue dried from a frozen state under vacuum the lipid solvents were added, the volumes in each case being about twice the wet volume of the original tissue suspension. After 2 hours in the cold room, the solvent was removed by centrifuging and decanting or by filtration, in either case the residue was resuspended in the solvent and at once recentrifuged or refiltered. Thereafter, with ether at -50°C , extraction was carried out in a similar way. The tissue was then freed from any residual ether by placing the container in a jar and exhausting by water suction.

Inasmuch as benzene extraction was found to provide the most potent antigen and proved to be least toxic to the rabies virus, further experimentation was undertaken, with the use of that solvent for extraction. Results of such experimentation went to show (1) Extraction with cold benzene and ether does not inactivate all the rabies virus in brain tissue but causes a marked reduction in the infective titre, (2) rabies vaccines, killed by preliminary ultraviolet irradiation and then extracted with benzene, suffer no loss of antigenicity, indeed they show, in most cases, a heightened antigenicity, and (3) rabies vaccines extracted according to the cold-benzene-ether method described above had much of their lipid content (41.5 per cent of the total dry weight) removed, thus eliminating "one of the major non-specific components of a very crude vaccine."

As a result of their experiments the authors conclude that, for the prevention of rabies benzene and ether-extracted vaccines may offer some advantage over unextracted vaccine

G Stuart

HABEL, K, BELL, J F & WRIGHT, J T **Benzene-Inactivated Rabies Vaccine**
Proc Soc Exper Biol & Med 1949 Mar, v 70, No 3, 455-7

In a previous article the authors [above] detailed a technique for the extraction, by benzene and ether, of infected, dry brain tissue containing rabies virus inactivated by ultraviolet light. Irradiation had then been employed for inactivation, because it was known to yield vaccines of high antigenic potency and because cold benzene and ether did not inactivate all of the virus.

In the present paper the authors describe a method for the inactivation of rabies virus by benzene alone during the course of extraction of brain tissue lipoids with that solvent. From experimental work it emerged that the virus contained in anti-rabies vaccines prepared from mouse and rabbit brain tissue could be wholly inactivated by exposure to benzene at 56°C for 12 hours and that the vaccines so treated showed no decrease in antigenic potency. Moreover, tests on mice and rabbits to determine the comparative antigenicity of benzene-inactivated and ultraviolet light-inactivated vaccines afforded proof that when there were differences, the benzene-inactivated vaccine in most instances showed the higher potency. From the above findings it may be concluded that inactivation of rabies virus by heating in benzene results in a highly potent vaccine and that the need for preliminary ultraviolet irradiation has been eliminated.

G Stuart

BELL, J F, WRIGHT, J T & HABEL, K **Rabies Vaccine freed of the Factor causing Allergic Encephalitis** *Proc Soc Exper Biol & Med* 1949, Mar, v 70, No 3, 457-61

The neuromyolytic accidents of anti-rabies treatment—post-vaccinal encephalomyelitis in man and its apparent counterpart, experimental allergic encephalitis in lower animals—are conditions which may occur when brain

tissue is injected parenterally. The aetiological agent concerned in the production of these accidents has long been sought and now as a result of the authors' successful search for an anti-rabies vaccine containing antigens of high potency, yet freed of the factor which causes allergic encephalitis in animals, the solution of the problem has been brought appreciably nearer. Such a vaccine was thought already to have been discovered when the authors at an earlier stage of their investigation had managed to remove the lipoids from the virus by treating the rabies-infected brain tissue with benzene and ether for at that time they believed that the removal of the lipoid components might also eliminate the material responsible for the paralysis. Experience showed, however, that their benzene-ether-extracted vaccine while suffering no reduction in antigenicity still retained its capability of producing paralysis in guinea-pigs.

In their efforts to remove from anti-rabies vaccine this paralysis-producing factor the authors had recourse to further experimentation during the course of which it emerged that after washing with M/10 calcium acetate solution followed by distilled water the virus antigen was precipitated from the vaccine without loss of its antigenic potency and such precipitate remained insoluble in water. The residual washed vaccine contained but 50 per cent. of the total nitrogen of the original vaccine and had a calcium content of 0.005 per cent. the factor causing allergic encephalomyelitis was present in the calcium acetate solution removed by filtration and could no longer be demonstrated in vaccines which had been previously treated with benzene and ether. Vaccines not previously so extracted were not freed of the factor causing paralysis when similarly washed with calcium acetate.

In view of the very great importance of the work described in the paper under review and of the possibilities which the findings hold out for the later employment in man of a wholly safe anti-rabies vaccine of high potency, it is considered desirable to quote the authors' summary of their paper —

"A method has been presented for the removal from rabies vaccine of the factor which causes allergic encephalomyelitis. This factor is not removed by extraction with benzene and ether but preliminary treatment of the vaccine with these solvents facilitate separation by subsequent treatment. The presence of calcium acetate prevents the loss of antigen when the vaccine is washed. It does not prevent removal of the encephalitic factor which appears to be water soluble. About one-half of the total nitrogen of the vaccine is removed by this washing process.

"The technique may be briefly summarized as follows —

(1) A suspension of infected brain in water is dried from the frozen state.
(2) The dried brain is extracted with benzene followed by ether (live virus may be killed in this stage by heating in benzene).

(3) After removal of the ether the dried brain is suspended in distilled water.

"(4) Sufficient solution of calcium acetate is added to make final concentration of M/10 calcium acetate and the suspension is permitted to stand in the cold for an hour or two.

"(5) The calcium acetate solution is removed by centrifugation or filtration and the sediment is resuspended in distilled water to the original volume with agitation (clumps of sediment must be broken up).

(6) The distilled water is removed by centrifugation or filtration.

"(7) The sediment is resuspended in distilled water or saline and homogenized. This is the washed vaccine.

G. Stuart

KOPROWSKI, H *Experimental Studies on Rabies Virus* *Canadian J Pub Health* 1949, Feb, v 40, No 2, 60-67

It is agreed that one of the most effective measures of rabies control is the mass prophylactic vaccination of dogs but, militating against the successful application of such measures have been, in particular, the necessity for multiple vaccinations and the recorded occurrence of post-vaccinal neuroparalytic accidents. The studies described in the article under review were undertaken primarily with a view to discovering an efficient "single injection" method of canine immunization which, in practice, would be free from the risk of subsequent paralytic accident.

That the egg-adapted FLURY strain of rabies virus gave greatest promise for the development of a vaccine which would meet these requirements was confirmed and extended by the author's experimental work. Thus guineapigs inoculated extraneurally, although slightly susceptible to the low egg-passage levels of the strain, became almost completely refractory to the higher level passages, and only occasionally did one animal out of ten inoculated with 20 per cent suspension of infected embryos show any signs of paralysis. Conversely, the immunity response of the surviving guineapigs, later challenged with street virus, was highly satisfactory.

Further repeated experiments adduced abundant proof that the FLURY strain given parenterally is innocuous for the canine species. Thus dogs, which received the intramasseter inoculation of a 20 per cent embryo suspension, survived the 12 months' observation period without having shown any sign of illness. Similarly animals which had been inoculated in the muscles of the hind legs with 5 cc of a 20 per cent suspension of the virus, or by the intramasseter route with a 40 per cent embryo suspension remained without ill-effect during the entire periods of their observation (2 to 6 months).

Encouraged by these results, the author then attempted a determination of the immunizing power of the FLURY strain in dogs. Animals were vaccinated in the muscles of the hind legs with a single 5 cc injection of either fresh or lyophilized preparations consisting of either a 20 per cent or 40 per cent suspension of infected chick embryos at various egg-passage levels and then challenged, at different intervals, varying from 5 to 27 weeks, by bilateral intramasseter inoculation with a 10 per cent suspension of street virus giving mouse-intracerebral LD 50 titres of $10^{-4.50}$ to $10^{-6.15}$. Of 66 dogs vaccinated, only 2 succumbed to the massive test inoculation, whereas 23 of the 37 control dogs died. Duration of such immunity in dogs is now under study.

Turning to the protection of human beings against rabies and the development of a procedure which would be as effective as the PASTEUR treatment but would not carry with it the danger of neuroparalytic accident, the author suggests the substitution of anti-rabies serum for the vaccines now in use. Experiments on the protective power of the serum (a concentrate of the beta- and gamma-globulin-containing fractions of pooled rabbit plasma fractionated by sodium sulphate precipitation) were carried out on hamsters along lines corresponding to those encountered in nature, i.e. first infection with street virus, followed by treatment, the remarkable protective value of one injection of antiserum, as contrasted with the lack of value even after full courses of phenolized vaccines in massive dosage or of living virus vaccines, was clearly demonstrated. Factors found to influence the action of the serum included its degree of dilution, the amount of virus present in the infecting inoculum and the time-interval between infection and treatment.

In the author's opinion, "the general evidence in favour of serum treatment is so conclusive, especially as the danger of neuroparalytic accidents following

serum treatment does not exist that a thorough field trial of serum prophylaxis in rabies is fully warranted."

C. Stuart

BÉQUIGNON J. R. & VIALAT C. Les vaccinations antirabiques à l'Institut Pasteur en 1947 [Anti-Rabies Vaccinations at the Pasteur Institute in 1947] *Ann. I. st. Pasteur* 1948, Aug., v. 75 No. 2, 163-7

This Report details the procedure followed at the Pasteur Institute of Paris in the treatment of persons exposed to the risk of rabies infection and provides statistics for the year 1947. During that year 71 bitten persons received treatment, no rabies death occurred and no neuromuscular accident followed treatment. Animals incriminated in the biting of the persons treated were 175 dogs, 23 cats and 8 rats. These animals included 1 in category A (proved rabid experimentally), 3 in category B (diagnosed rabid clinically) and 208 in category C (suspect only). It is noted that 1947 was the 23rd successive year in which no rabies death occurred among persons treated at the Institute.

Of the 54,990 persons treated during the 62 years period 1886-1947 there were 7,083 bitten by animals in category A, 27,190 by animals in category B and 20,717 by animals in category C. 151 died of rabies thus providing a percentage mortality of 0.28.

G. Stuart

PLAGUE

BERNARD L. DOUVET G. & JAUJOU Une épidémie de peste bubonique à Ajaccio (1915) [An Epidemic of Bubonic Plague at Ajaccio (1915)]. *Rev. Trans. Inst. Nat. Hyg. Paris* 1948 v. 33, 5-16 figs

In this outbreak 13 persons were attacked within a period of 10 weeks in the months May, June and July 1915. The disease had not been known to occur in the Island of Corsica within living memory so the infection must have been introduced by the sea route.

Reference is made to the finding of dead rats before the outbreak but these were not examined. All the 148 rats trapped afterwards were found free from infection of these 14 were *Rattus rattus alexandrinus* and the rest were *R. norvegicus*. On the 148 rats only 101 fleas were found, 47 of these were *Xenopsylla cheopis* of which all but 8 were found on the 14 specimens of *R. rattus*.

The outbreak was confined to three small areas one of which was military barracks. All the usual measures of control were very thoroughly carried out, including the compulsory vaccination of all the 35,000 inhabitants of Ajaccio. The complete disappearance of the disease was attributed partly to the scarcity of the vector fleas and partly to the measures of control that were adopted.

John B. D. McGee

TEJAN Y. T. Culture de *Pasteurella pestis* à partir d'un seul microorganisme
Cultivation of *P. pestis* starting from a single cell. *Univ. Soc. Path. E. et. Afr.* 1949 42, Nov. 34 89-91

Using a micromanipulator the author has succeeded in isolating single cells of *P. pestis* on ten occasions from a suspension of the organisms maintained in peptone water for four hours at a temperature of 34°C. 1-3 three coves a single cell gave rise to cultures on peptone agar. For details of the technique the original paper must be consulted.

The cultures have been made over to G Girard who proposes to study them from the point of view of obtaining living attenuated vaccines originating from single cells, the original culture used by the author was of an avirulent strain

John W D Megaw

DEVIGNAT, R La prophylaxie de la peste au Lac Albert par l'association de la dératisation et de la vaccination (virus-vaccin E V de Girard et Robic) [Plague Prevention in the Lake Albert Region by Rat Destruction combined with Vaccination with the Girard-Robic Vaccine] *Bull Soc Path Exot* 1949, v 42, Nos 1/2, 43-52, 1 graph

This paper deals with plague prevention as practised during the years 1937-46 in a zone of 100 by 40 kilometres on the west shore of Lake Albert on the borders of the Belgian Congo

Every month a gang of rat catchers visits each occupied hut in the zone and seeks out the nests of the rats The result has been an apparent increase in the rat population, the average number found in each hut was less than one in 1937-38 and it now ranges from 2.1 to 2.5 The average number of fleas found on each rat has, however, been considerably reduced—to about one-third of the previous figure

During 1939 and 1940 the rat-flea population was at its lowest, yet these were the years of highest prevalence of plague

The rat-catching campaign was maintained as a means of detecting the presence of infection, pooled suspensions of femoral bone marrow of all the rats caught in each village were inoculated into guinea-pigs and when infection was detected the villagers were inoculated with the Girard-Robic living avirulent vaccine [See this *Bulletin*, 1939, v 36, 314]

During the whole period about 400,000 doses of vaccine were given, and the author is satisfied that it was highly effective, there were only 16 cases of plague among the vaccinated against 116 among [an unstated number of] unvaccinated persons The earliest attack in a vaccinated person occurred three months after vaccination

An increase in virulence of the living vaccine occurred on one occasion, but the virulence was reduced to the former low level by passing a stream of air through a solution of caustic potash and then through broth cultures of the strain This process was continued for eight days, it had already been found effective in reducing the virulence of three local strains of fully virulent *P pestis*

John W D Megaw

DAVIS D H S Current Methods of controlling Rodents and Fleas in the Campaign against Bubonic Plague and Murine Typhus *J Roy San Inst* 1949, May, v 69 No 3 170-75

A useful survey of present methods

GRATCH, I, PURLIA, P L & MARTIN, M L Effect of Sodium Fluoroacetate (1080) in Poisoned Rats on Plague Diagnosis Procedures Preliminary Report *Pub Health Rep Wash* 1949, Mar 18, v 64, No 11, 339-42

By fully controlled experiments the authors have found that rats poisoned with sodium fluoroacetate are just as suitable for bacteriological examination to detect the presence of plague infection as are rats caught by trapping or poisoned by hydrocyanic acid gas

As ordinarily used the fluoroacetate does not reach the liver of the rat in quantity sufficient to damage guinea-pigs inoculated with suspensions of the

liver and it has no adverse effect on the viability of *Pasteurella pestis* contained in the tissues of infected guinea-pigs.

In vitro the poison was found remarkably free from bacteriostatic effect on cultures of *P. pestis*.

John W. D. Megaw

SERGEANT Ed & SERGEANT Et. Nouveau procédé de dératisation basé sur l'emploi du DDT [A New Method of Rat Destruction by DDT] *Arch. Inst. Pasteur d'Algérie* 1949 Mar v 27 No 1 18-30 1 fig. [Refs. in footnotes.]

A powder containing 80 per cent. DDT deposited in and round the entrances of rat holes has been found to kill within a few days about 80 per cent. of the rats. The powder is left permanently to ensure cumulative action of the poison.

No details of the quantity applied are given except for the statement that the powder is used in the same way as for the destruction of cockroaches. For mice a 5.0 per cent. powder is said to be effective.

Although the powder is not highly toxic for man and domestic animals precautions are recommended against the risk of contamination of foodstuff and of contact with domestic animals especially cats.

John W. D. Megaw

CHOLERA

DE MOOR, C. E. Paracholera (El Tor): Enteritis Choleraformis El Tor van Legeren. *Bull. World Health Organization* Geneva 1949 Mar 2, v 1 5-17 2 maps. [Refs. in footnotes.]

Following on earlier reports on choleraform disease in Celebes attributed to a haemolytic vibrio (this *Bullet.* 1939 v 38 374) another account of investigations on the subject is given with a discussion of its epidemiological significance. The questions are raised (1) whether the haemolytic vibrio of Celebes and the *El Tor* are identical, (2) whether the disease in the Celebes is distinguishable from cholera, and (3) whether quarantine regulations should be applied against cases and carriers from which the *El Tor* type of vibrio is isolated.

The Celebes cases were not distinguishable clinically from Asiatic cholera and the mortality varied from 69 to 73 per cent.

Bacteriology.—Strains of the haemolytic vibrio were examined which had been isolated from 370 sources in the Celebes including patients, contact and other healthy persons and from wells both in the vicinity of cases and in areas where the choleraic condition had not occurred. All strains were serologically identical with *V. cholerae* and the *El Tor* vibrio by the usual agglutination tests.

water was added to a 1 in 200 dilution of cholera-O serum in 0.3 per cent. Na_2CO_3 , H_2O it promptly agglutinated a suspension of *V. cholerae* similarly treated remained unaffected. A thick suspension of *V. cholerae* in 0.5 per cent. NaHCO_3 was completely precipitated when treated with an equal volume of a 0.5 per cent. solution of HgCl_2 but a suspension of the *El Tor* vibrio remained stable.

A study of the haemolytic action of the Celebes and *El Tor* vibrios showed the following to be characteristics of newly isolated strains: (1) haemolysis in blood broth within 4 hours growth; (2) positive Coagulase test with both cultures and (3) beta haemolysis on anaerobically incubated blood agar. Greg's test

was usually positive with broth cultures 12-hours old, the haemolysis being strongest with cultures 2-days old, but cultures 4-days old were no longer haemolytic. In the refrigerator a broth culture retained its haemolytic power for weeks. Cholera strains were found to show only slight haemolysis in blood broth cultures and at the earliest after 48 hours growth. Greig's test was always negative. On blood-agar, only digestion of blood-pigment was visible.

The test for acetylmethylcarbinol by Barritt's method was not fully differential.

No difference in behaviour was demonstrated between the vibrio of Celebes and that of El Tor.

The epidemics The first outbreak described consisted of 48 cases distributed over a period of eight months from September, 1937, to April, 1938, with a very scattered distribution. The second series occurred between October, 1939, and April, 1940, and included 37 cases within a radius of 20 km. around Lake Tempe and 26 cases divided between two areas of the East Coast. The third series consisted of 7 cases in 1946 which were also widely scattered. The total recorded from September, 1937 to December, 1944, was 118 cases in 70 *kampongs*. There was no seasonal incidence, cases occurring both in an extremely dry season and in a wet season of the year. Cases were sporadic and there was no tendency to spread to large centres of population in spite of extensive road traffic. In view of the very low and scattered incidence and the absence of epidemic tendency the mass inoculation and isolation measures which were at first applied were later omitted.

Incidence of the vibrio The vibrio was isolated from the stools of 10 per cent of 579 family contacts examined, and from 42 per cent of the 132 wells used by patients. Half of the family contacts examined continued to excrete the vibrio after one week but, with one exception, they became permanently negative after 11 days. The vibrio was recovered intermittently from the exceptional case up to 27 days. The examination of 5,566 healthy persons in the infected area who were not family contacts resulted in the vibrio being isolated from 21 (0.4 per cent). The organism was also isolated from 43 out of 1,023 wells (4 per cent) in *kampongs* in these areas. In *kampongs* where cases had actually occurred it was isolated from 0.9 per cent of 1,225 healthy persons and 6 per cent of 172 wells. In uninfected areas, and even where the disease had never been noted, the vibrio was occasionally found.

Epidemiological considerations The opinion is expressed that the El Tor vibrio is an accidental resident in water but does not thrive there. The author considers infection of wells and rivers with the El Tor vibrio to be of human origin and that the vibrio is maintained by successive groups of persons becoming temporary carriers, chronic carriers are not found. Vibrios in wells act as indicators of human infection.

The sporadic and static character and the low mortality of the disease attributed to the El Tor vibrio are in striking contrast with the epidemic nature of cholera with its tendency to spread and its high morbidity. After an epidemic the cholera vibrio disappears from the community while the El Tor vibrio may remain in an area for prolonged periods and may even be found where no cases of choleraform disease have occurred.

Occasional pathogenicity, static character, sporadic occurrence, and slight morbidity explain why the El Tor disease has not been encountered during the Mecca pilgrimage and in countries around the Red Sea (Hejaz, Egypt and Iraq) and in Bengal and Madras where the true El Tor vibrio has been found in healthy persons or in wells.

The El Tor disease is a commensal infection and is sporadically of endemic nature while cholera is a parasitic infection and is endemic. It is suggested the disease caused by the El Tor vibrio should be designated "paracholera El Tor."

Quarantine strict isolation of sick persons disinfection and mass immunization are not justified in the case of paracholera because this disease does not spread epidemically and claims in the long run few victims. However so long as there is no general agreement on the identification of the El Tor vibrio a paragraph will be necessary in any international quarantine convention on cholera, regulating the official notification of cases of paracholera (El Tor) and of carriers of the El Tor vibrio." Van Loghem is quoted as stating that "If the difference in kind between *V. cholerae* and *V. bius* El Tor is recognized there is no question of cholera asiatica but of an El Tor disease. He proposed the term enteritis choleraiformis El Tor."

[The observations presented support the usual practice of not applying quarantine measures when the El Tor vibrio is isolated. It can readily be differentiated from *V. cholerae* to which alone quarantine regulations will apply and it would hardly be necessary to make special regulations in regard to it.]

J Taylor

VEERARAGHAVAN \ A Simple Medium for Cultivation of *V. cholerae*. [Correspondence] *Nature* 1949 Jan. 22, 138.

Heavy growth of *V. cholerae* was obtained in a liquid medium consisting of a salt mixture with L-cystine glucose and "Marmite" at initial pH of 8.8 when alkalinity was maintained by the periodical addition of sodium bicarbonate and small quantities of glucose added at the same time. Ammonium sulphate was included in the salt mixture and without it growth ceased at the end of 10 hours. When sodium bicarbonate and glucose were added 1, 10, 18 and 24 hours from the beginning of incubation and the pH raised to the vicinity of 8.0 the concentration of vibrios in the culture reached 12,000 to 14,000 million at the end of 30 hours.

J Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

CORLEO E. Rectal Swab in the Investigation of Diarrhoea in Children. *Indian J Med Sci* 1949 Apr v 3 No. 4 266-71

The apparatus required for preparation of rectal swabs consists of a proctoscope glass slides and cover slips, normal saline, iodine solution soft paraffin and "broom sticks" to which the cotton swabs are attached. The results of examination of rectal swabs in 229 acute and 74 chronic cases of diarrhoea demonstrate that the rectal swab provides a sample of the rectal contents adequate to discover all the abnormal findings normally found on faeces examination.

A second table in a comparison between rectal swab and stool examination in 59 patients shows that a percentage of acute diarrhoeas in children is due to a bacillary infection. The figures for macrophage cells are nearly equal while for pus cells the sample from the rectal swab is definitely better moreover it gives a positive result for *E. histolytica* more often particularly for the active trophozoites and it is also better for the detection of *G. duodenalis* ova. A search through voided stools is more profitable for finding round worm ova. In "normal" patients the rectal swab detected more with *Gardia* and cysts of *E. histolytica*. In 15 out of 30 patients the rectal swabs failed to reveal anything but there were only eight negative results with stool examination.

The rôle of giardiasis in acute and chronic diarrhoeas of children is important. Out of 310 acute diarrhoeas 16.4 per cent were due to this infection, as were 43 per cent of 130 chronic diarrhoeas. The youngest child in whom *Giardia* was found was 14 days old.

P Manson-Bahr

REDDY, D G & THANGAVELU, M. Some Aspects of Amoebiasis in Madras. *Indian Med Gaz* 1948, Dec., v 83, No 12, 557-63, 6 figs on 2 pls [25 refs]

An analysis of 2,641 cases treated in the General Hospital, Madras, is as follows —

Dysentery	Total number of cases	Percentage of incidence	Number of deaths	Percentage of deaths
Amoebic	1 011	38.3	62	6.13
Bacillary	1 345	50.9	134	9.9
Mixed	28	1.1	1	3.8
Non specific	257	9.7	47	14.4

In children the incidence of amoebic infection is low. This is well brought out by figures shown in a table. Males are infected more frequently than females. Amoebiasis in general does not exhibit that seasonal incidence which is so characteristic of bacillary dysentery. In 44 postmortem examinations intestinal lesions were found in 38 and hepatic lesions only were seen in the remaining six. In most cases, the primary lesion begins in the caecal area, but with the progress of the disease the entire colon seems to become involved. In only two cases was amoebic involvement of the appendix observed, but the rectum is frequently affected. Amoebic granuloma was occasionally seen. An account of six such cases has already been published [*this Bulletin*, 1947, v 44, 583]. Amoebic ulceration may co-exist with typhoid.

From 1941 to 1946 1,534 cases of hepatitis were treated in the Government Hospital, Madras, and of these 364 (30 per cent) were diagnosed as being of amoebic origin, during the same period 84 cases of liver abscess were treated in the surgical wards of the General Hospital and 40 in the King George Hospital, Vizagapatam. The largest number fall under the age group of 20 to 50 years, and the incidence of liver abscess among Hindus is about twenty times that in Muslims. Males are much more commonly affected with liver abscess than females.

In six out of 15 cases of liver abscess specially investigated at autopsy there was no evidence of recent intestinal lesions. Multiple abscesses were present in 3 of 15 cases.

Deep jaundice of an obstructive type is a very rare accompaniment of amoebic abscess of the liver and an instance of this is recorded, where an encysted liver abscess caused an obstruction of a main bile duct and eventually produced biliary cirrhosis.

Encysted liver abscess may be mistaken for a solitary gumma. Rupture into the pericardium is very rare and occurs in abscess of the left lobe where it may be mistaken for tuberculous pericarditis or other pericardial effusions. One such instance is recorded. A case is also described where the abscess contents entered the rectus sheath.

The authors discuss pulmonary amoebiasis, amoebic abscess of the brain and cutaneous amoebiasis and quote cases from the experience of other workers. None of these conditions is recorded in their own series.

P Manson-Bahr

SEN V. C. Amoebic Vaginitis. *Brit. Med. J.* 1949 May 7 808.

Amoebic vaginitis is rare and the author refers briefly to the available literature [see this *Bulletin* 1944 v 41 44 133 1945 v 42 38 1946 v 43 42]. He then reports the case of a Nepalese woman of 33 complaining of a profuse seropurulent vaginal discharge with some soreness in the vulva and vagina and a burning sensation during micturition. The discharge was almost continuous and unrelated to menstruation.

The discharge had been present for some 4 to 5 months about one month before it was noticed the patient had had a severe attack of dysentery (presumably amoebic) for which non-specific treatment had been given elsewhere.

Pelvic examination showed slight swelling of the right labium, the cervix and the uterus, which was soft and anteverted. There was a small ulcer in the fourchette many linear ulcers lying mostly transversely in the mucosa of the vagina, and extensive ulceration of the cervix. The ulcers were punched-out with overhanging edges and raw bases.

Many active forms of *Entamoeba histolytica* were found in smears of the vaginal discharge from scrapings of the ulcers and from the discharge obtained by milking the urethra. Cysts of *E. histolytica* were found in the stools, but no ulcers were found in the lower ano-rectal canal. The liver was enlarged and tender and the descending and iliac colon was thickened.

Emetine (1 grain daily intramuscularly) was given to a total of 1 gram (in 15 days) together with local saline douches. After five days, discharge and discomfort were relieved, the ulcers were almost healed and the cervix was returning to normal. A few round and sluggish forms of *E. histolytica* were found in the aspirated cervical discharge similar forms were found in a catheter specimen of urine. A local treatment was given for an accompanying cystitis but emetine was continued, followed at night by stovarsol vaginal compound and an alkaline mixture.

The ulcers healed completely in two weeks, the symptoms and discharges disappeared and the patient felt quite well.

The diagnosis of amoebic vaginitis is based on the presence of the vegetative forms of *E. histolytica* in the discharges and the ulcers, the response to amoebicidal drugs and the morphological character of the ulcers.

The author suggests that infection of the vagina is by continuity with the recto-rectal canal, the method of ablation after defaecation as practised in Bengal would no doubt help mechanically. The uterus is often enlarged and it may well be infected in some cases also. It is suggested that leucorrhoea due to *E. histolytica* may be fairly common in India and should be constantly borne in mind.

H. J. O'D. Burke (Gall.)

VAN STEEN P. B. Naak te opmerkingen over de behandeling van amoebien dysenterie en amoebiasis. [Observations on the Treatment of Amoebic Dysentery and Amoebiasis. *Nederl. T. Genees.* 1947 Jan 8 v 83 (4) 105-11. English summary (5 lines).]

A brief review and discussion of the drugs used.

EL-CHAMRY A. A. Th. Combined Use of Salvarsan and Diiodoquin in the Treatment of Amoebic Infections of the Intestine. *J. A. Egypt. Med. Ass.* 43 1949 J. 1-5.

The theme of this paper is based on the belief that bacterial infection of the intestines is an important contributory factor to the pathology of amoebiasis.

On this basis, sulphasuxidine and diodoquin were given to 36 patients with acute and 50 with chronic amoebic dysentery

The first group manifested the usual symptoms, frequent blood and mucus stools, tenesmus and colic. The symptoms associated with the second group were varied and included a variety of obscure abdominal pains and discomforts. The faeces usually contained *E histolytica* cysts. Sulphasuxidine was given in doses of 3-4 tablets (0.5 gm each) three times daily for 15 days, and diodoquin, 3 tablets (0.21 gm each) three times daily for 20 days. The anti-amoebic drug was given simultaneously with the anti-bacterial drug so as to enable it to exercise its inhibitory effect on the bacteria.

The patients with acute infections responded rapidly. No relapses have yet been reported though the first patient received treatment seven months previously. Results in chronic cases were variable. Improvement was marked in half of them. A few who relapsed quickly responded when treatment was resumed. Some in whom improvement was not very satisfactory received another course 2-3 weeks later "with better result". Pruritus ani occurred in a few cases and Paramibe, a preparation of the same chemical constitution as diodoquin was substituted. No untoward effects were observed.

P Manson-Bahr

CROSNIER, R, BERNIER, G, MOLINIER, A, BESSEIGE, H & LEFEBVRE, P
Prééminance thérapeutique de la conessine dans l'amibiase aiguë [High
Therapeutic Value of Conessine in Acute Amoebiasis] *Bull et Mém Soc
Méd Hôpité de Paris* 1949, Nos 9/10, 386-92

The authors advocate a gross dosage of 5 gm to 6 gm of conessine, given by mouth, according to the tolerance of the patient, they stress the fact that under no circumstances must the daily dosage exceed 0.5 gm, the daily dosage is decreased as treatment progresses over a period of two weeks. Adjuvant treatment consisted of the administration of calcium gluconate in 1 gm doses intravenously daily, gardenal was given as necessary, and a salt of quinine was also given "as a general tonic, to neutralize the nervous phenomena, and as an antimalarial".

Conessine can be given with impunity when there are signs of emetine poisoning, emetine-resistant infections are susceptible to it, there are no contra-indications to its use, as it causes no serious toxic action, but it should always be given under close medical supervision, the recommended course of treatment must strictly be adhered to. Conessine can be given intramuscularly in doses of 0.1 gm, the injections are painless owing to the local anaesthetic properties of the drug but there is local necrosis, while intramuscular injection is not advised it may be resorted to in cases of alimentary intolerance.

One hundred and twenty-eight cases of intestinal amoebiasis were treated with conessine, 12 of them were cyst-passers. One hundred and fifteen (68 per cent) of these were cured of their infections. The "cure" was consolidated in most cases by a repetition of the course, but of the 44 patients re-treated 9 were found still to be infected and another 3 subsequently suffered attacks of acute amoebic dysentery. It is concluded that the treatment gave a cure rate of 89 per cent. Nineteen cases of amoebic hepatitis were treated, apparently with satisfactory results, with conessine.

Various suggestions are made on further lines of investigation of the action of conessine in amoebiasis, which the authors state to be equal or superior, to emetine.

A R D Adams

SIGUIER F., CROSTIER J. & SAPIE JALOTIERE, IL. Amibiase hépatique sural-cite probable. Ecbec d traitement mixte émetine-cosamine-penicilline. Guérison par l'association émetine-streptomycine [Probable Secondary Infection in a Case of Hepatic Amoebiasis. Failure to respond with Combined Emetine-Cosamine-Penicillin Treatment and Cure with Emetine combined with Streptomycin.] *Bull. d'Urm. Soc. Méd. Hôpit. de Paris* 1949 No. 13 11 620-24 3 figs.

MANSON BARR P. The Treatment of Amoebic Liver Abscess with Chloroquine. *J Trop Med & Hyg* 1949 May v 5 No. 5 91 3 1 chart. [10 refs.]

While emetine combined with emetine bismuth iodide is usually effective in the treatment of hepatic amoebiasis there is a residue of cases of liver abscess in which these drugs fail to act.

The author refers to the use of chloroquine in hepatic amoebiasis and suggests that it probably acts by concentration in the liver parenchyma [for experimental observations on animals regarding relative concentrations of emetine in the liver and intestine see this *Bulletin* 1948, v 45 1004].

The history and pharmacology of chloroquine and related substances are discussed and reference is made to two published accounts of its use in hepatic amoebiasis. COVAX this *Bullet* 1948 v 45 490 reported rapid disappearance of clinical manifestations in six cases of hepatic amoebiasis but a persistence of *E. histolytica* in the stools of 13 out of 23 patients having intestinal amoebiasis after treatment with chloroquine as the drug is almost entirely absorbed from the gastro-intestinal tract its effect on intestinal amoeba is attributed to plasma or tissue concentration.

MURRAYROD and KENT demonstrated a case at a Laboratory Meeting of the Royal Society of Tropical Medicine and Hygiene (*Trans Roy Soc Trop Med & Hyg.* 1948 42, 15) in which trophozoites of *E. histolytica* were present in the liver pus, but were resistant to emetine. On the fifth day of treatment with chloroquine (0.25 gm. three daily by mouth for 18 days) the amoebae disappeared and by the twelfth day the abscess cavity had healed. The patient was well enough to be discharged from hospital two weeks after completion of the course and was prescribed a maintenance dose of 0.5 gm. chloroquine twice a week for 3 months (in this case the discharging liver abscess had been opened 4 months before and had also resisted treatment with penicillin and streptomycin given to deal with secondary infections present).

In the case under review the present author treated a European patient suffering from an advanced amoebic abscess of the liver who had been interned in Siam for 3½ years. He had no history of amoebiasis but in 1948, two years after he returned to Calcutta, symptoms of this condition began. Clinical and radiological evidence suggested that he had subacute hepatitis complicated with early pulmonary tuberculosis. He was given a course of streptomycin with no apparent effect on his pyrexia. Later he became worse and the manifestations of amoebic abscess of the liver became evident. In October 1948, in Madras, he was given emetine and penicillin and 1½ pints of amoebic pus were removed from his liver. On arrival in Britain he was extremely ill and the evidence of liver abscess was still marked. No amoebic cysts were found in the stools.

There was no adequate response to emetine followed by emetine bismuth iodide. Chloroquine was then given and the temperature chart (reproduced in the paper) showed an almost immediate response. The temperature became normal and the signs less apparent. However pyrexia began again some 10 days later but yielded to renewed chloroquine therapy. Pyrexia was then uninterrupted and the patient is now in good health.

The first course of chloroquine diphosphate consisted of 4 gm over eight days and the second of 4.75 gm over 16 days. The priming dose was 0.75 gm (0.45 gm base) followed by a sustained dose of 0.3 gm daily and later 0.5 gm (0.3 gm base) daily. No toxic effects were observed. Half the amount of chloroquine appeared to be equally effective in controlling the fever during the second course.

H J O'D Burke-Gaffney

LEPROSY

SEN, P. **Leprosy in Calcutta** *Internat Med Abstracts & Reviews* Calcutta 1949, Jan, v 5, No 1, 20-23

This note gives data regarding the incidence of leprosy in Calcutta as compared with adjacent districts, and discusses the suitability of the city for the proposed all-India Leprosy Institute. Surveys of the disease in cross sections of the Calcutta population showed that the incidence varied between 0.3 and 1.65 per cent with an estimated rate of 0.5 per cent, or 20,000 in a population of 40 lakhs (4 millions) including the suburbs. Work in the four Calcutta clinics showed over 10,000 leprosy patients as permanent residents, some Calcutta dermatologists consider this to be an underestimate. A table shows the estimated number of leprosy cases and the rate per thousand population in the districts of Western Bengal, which are all higher than in Calcutta, but the author thinks that the greater density of cases makes them more dangerous in Calcutta. In the latter part of the paper he advocates Calcutta as the best site for the all-India Leprosy Institute on account of the laboratory and other medical facilities and a leprosy hospital with nearly 200 beds for permanent patients. [This opinion ignores the great advantages of an agricultural colony with ample land for cultivation and for housing far larger numbers of cases than Calcutta can provide for, with greater facilities for testing new drugs on in-patients under close observation.]

L Rogers

TISSEUIL, J. **Sur 3 inoculations positives de la lèpre humaine au rat d'élevage** [Successful Inoculation of Human Leprosy into Rats] *Bull Soc Path Exot* 1948, v 41, Nos 11/12, 649-52

The author has in three instances, out of a number, succeeded in inoculating human leprosy into rats. In the first positive experiment, an emulsion of leproma from an Argentine patient was injected into the testis of 20 rats. A small yellow lump in the testis of one of them was grafted under the skin of another rat and produced a nodule, sections of which showed very numerous bacilli. Passages into the testicles of three other rats were negative. In the second experiment, ten rats were injected with suspensions of lepromata and the surviving rats were re-inoculated from a leproma five months later and after six more weeks a nodule with a caseous centre was inoculated into each flank of another rat, which resulted in a nodule very rich in bacilli, and further passages of the bacilli were obtained. In the third positive experiment, 10 rats were placed in an hermetically sealed chamber contaminated by pulverized lepromata and one of the rats killed 15 months later showed miliary nodules and a little caseous material in the lungs rich in bacilli, which could not be cultivated on Löwenstein's medium. Inoculation into a guinea pig caused a general infection free from evidence of tuberculosis. Five rats inoculated at the same time were killed eight months later and all of them showed gross lepromata at the site of inoculation.

The author then discusses criticisms of his work, especially the occurrence of spontaneous rat leprosy and without under-estimating them he considers it was useful to record his experiments to help others with regard to such inoculations.

L. Rogers

LIANG Sadie & CHOW G. H. The Blood Picture in Leprosy. *Amer J M I Sci* 1949 Mar v 17 No. 3 268-70. (13 refs.)

Previous literature shows differences of opinion regarding the blood changes in leprosy, so the authors, in China, have carried out estimations in 98 cases which had not recently been under treatment. Those showing helminthic infection were treated before the blood was examined. The authors did not find that promin treatment had much effect on the blood except in causing some reduction in the haemoglobin but the red and white corpuscle counts were little affected by the drugs used. Both lepromatous and neural cases are included, but patients with intercurrent diseases were excluded. The results are shown in tables and include the following data. Wright's stain and the Wintrobe haemocrit were used and the results are compared with the standard figures of Wintrobe and with those of Chinese workers, which do not deviate much from the general average. Anaemia was rather constant but in no case severe. Macrocytic and normocytic anaemias were met. Reticulocyte counts were distinctly low and they varied between 0- and 0.9 per cent. This the authors are unable to account for. The sedimentation rate was raised in all but four and averaged 18 mm. Leucocytosis of a moderate degree was present in 10 or 27.7 per cent chiefly in advanced lepromatous cases. Only two showed moderate leucopenia. The neutrophil count was definitely deviated to the left but this is usual in the Chinese so it is not significant. High eosinophil counts were a notable feature even when the stools had become negative as regard helminths, so they consider this related to the disease especially in its lepromatous form in which type it chiefly occurred. Monocytosis and lymphocytosis showed a high incidence with 19 cases or 5.2 per cent of each, which is not surprising in such a chronic disease as leprosy. During their two years work there was no clinically marked flare-up or deterioration resulting from treatment among the severe cases. Neither lymphocytosis nor monocytosis appeared to have any prognostic value but the authors agree with other workers that they may be useful indicators of the presence of leprosy. L. Rogers

DHARMENDRA. A Note on the Histopathology of Leprosy. *Internal M J Abstracts & Review* Calcutta. 1949 Jan v 8, No. 1 5-8.

FLOCH H. & CAMAIX R. Aspects histopathologiques de la Lèpre en Guyane française. *Histopathological Aspects of Leprosy in French Guiana*. *Istitut Pasteur de l'Amérique du Nord et de l'Inde*. Publication N° 176 1949 July 7 pp.

The authors in French Guiana carried out work during one and half years on the histology of leprosy including the effects of sulphone treatment. In the first place they agree that the histological changes in different (or intermediate) uncharacteristic cases this *Bullet* 1947 41 153. In leucoid and lepromatous cases the histological picture is different. They agree with the observations of FRIED and CHAMBERLAIN concerning the histological changes in cases improving under sulphone treatment. The histological picture follows the points. In lepromatous cases under sulphone treatment, there are changes of cutaneous epithelium and there are IL accumulated. There are few numerous infiltrations. The lymphocytes are seen and the plasma cells

diminish in numbers. With the atrophy of the nodules, connective tissue cells predominate. On the contrary, in "indifferent" and tuberculoid forms the histological appearances are not affected by sulphones.

Sections are better for determining the changes in the number and appearances of the lepra bacilli than are teased specimens. The examination of at least four sections is recommended. By this method the percentage of bacteriologically positive cases is raised to 31 of "indifferent" and to 29 in tuberculoid minor and to 88 in reacting tuberculoids, so that in tuberculoid cases when examined in stained sections the organisms are more frequently found than by former methods. Under sulphone treatment the lepra bacilli become much decreased in numbers, show morphological changes and do not stain as well, especially those in the neighbourhood of blood vessels. This, the authors think, explains the resistance of "indifferent" and tuberculoid cases to sulphones, because in these forms there is less vascularity and many of the organisms are protected from the action of the drugs by being situated in nerve trunks, which the sulphones reach with difficulty. *L. Rogers*

COCHRANE, R. G. Some Brief Comments on the Classification of Leprosy. *Internat Med Abstracts & Reviews* Calcutta 1949, Jan, v 5, No 1, 2-5

COCHRANE, R. G., RAMANUJAM, K., PAUL, H. & RUSSELL, D. Two-and-a-Half Years' Experimental Work on the Sulphone Group of Drugs. *Leprosy Review* 1949, Jan-Apr, v 20, Nos 1/2, 4-64, 15 figs & 1 chart [14 refs]

This long paper records brief notes on 54 cases of leprosy treated by sulphones in South India in the course of two and a half years. Most of them were given diasone or sulphetrone orally with very similar results to those recorded previously by a number of leprologists. Of greater interest are six cases given injections of sulphetrone with very similar results to those obtained after its oral administration, but obtained with a total average dosage of 81 grammes in place of an average of over 3 000 grammes by oral use, a very material saving in cost per case. A discussion of the whole series with a comparison with hydnocarpus oil treatment brings out the following points, including the effects of injections of the much less expensive sulphone, diamino-diphenylsulphone, in eleven cases. Good photographs of six cases before and after treatment are given, but unfortunately the table relating to them does not give the number of pages referred in the text in the case of two, and in two others such data do not appear to correspond with those in the text. The first part of the paper concludes that for oral use sulphetrone is superior to diasone, a conclusion others had previously reached. About 30 per cent of those treated with diasone showed reactions, but they later subsided in spite of the drug being continued without rest and they did not recur in any cases after 1000 tablets had been given. Furthermore, under this drug the only cases that became negative were in boys who received relatively large doses, so maximum dosage is indicated, but the high cost rarely allowed more than 4 tablets a day to be given. With oral sulphetrone only one patient had a very severe reaction and foot drop followed. Four of the nine became negative within two years.

Owing to the high cost of diasone and sulphetrone given orally, which prohibits its use on a large scale, and the necessity of giving daily intravenous doses of promin, the author has tried injection of sulphetrone with interesting results. The active principle of all three, namely, sulphone or diamino-diphenylsulphone has also been tested by injection, but the case notes and comments show that the latter gave rise to more severe reactions. Treatment by sulphones in general is also compared with that by the injection of hydnocarpus oil. The best results were obtained by subcutaneous injections of 7 cc

of 50 per cent. sulphethione in water twice a week. On the other hand sulphone in doses of 1 to 1.5 gramme a week in a strength of 25 per cent. suspension in groundnut oil is probably the most potent remedy but one which produces severe reactions in the form of anaemia, giddiness and sickness and peripheral neuritis sometimes of an alarming degree. This prohibits its use on a large scale until a safe dosage is found. In early lepromatous cases hydnocarpus treatment is the best. This paper should be studied by all interested in leprosy treatment.

L. Rogers

FLOCH H. & CAMAIX R. Sur le traitement de la lèpre par les sulfones en Guyane française. (Treatment of Leprosy by Sulphones in French Guiana.) Institut Pasteur de la Guyane et du Territoire de l'Est. Publication No 179 1948 Sept. 11 pp. [14 refs.]

As in French Guiana lepromatous cases constitute only one-third of the total cases the sulphone treatment had been used in all three types with interesting results. Both promin and diasone have been used in doses advised by early American workers in patients under the age of 20 years as a rule. Details are given of some of the cases and the following are the main conclusions arrived at after treatment for eight to eighteen months. In lepromatous cases retrogression was noted as described by earlier workers. In nine "indifferent" forms improvement was noted in six, aggravation in two and no change in one so the results were less clear than in the lepromatous type. Some degree of improvement in nerve symptoms was also noted. In three tuberculoid cases after 20 months two were stationary and one was aggravated. The histological and bacteriological changes were as described in the above paper by the same authors. Any signs of anaemia were easily controlled by iron. In only three lepromatous cases were reactions seen. The authors consider that the action of sulphones is to destroy the lepra bacilli in the more vascular lesions as well as those which enter the blood stream.

L. Rogers

FLOCH H. & CAMAIX R. Sur le traitement de la lèpre en Guyane française par les dérivés sulfonés. (Sulphone Treatment of Leprosy in French Guiana.) Bull Soc Path. E et 1948 v 41 Nov. 11/12, 646-9

The authors report on trials of promin and diasone during sixteen months. They were used in doses and with intervals similar to those in the case of the original trials at Carville and moderate degrees of anaemia met with were readily controlled by iron. Only a few slight reactions were met and they subsided readily. Diasone was not well borne by some patients. Promin was used in three tuberculoid and thirteen indifferent undifferentiated cases in children with no clinical improvement except in two pre-lepromatous indifferent cases in which histological examinations showed some trophic reaction as well as with round cell infiltration and return to the indifferent type but little change was found in frankly indifferent cases. In the case of nine lepromatous cases there was a definite slow retrogression of the clinical symptoms in the following order. First nasal and conjunctival signs disappeared next trophic ulcers healed, followed by decrease of lepromatous and dermal infiltrations which was slowest in the case of the ears and lastly improvement in sensation occurred. Further the mental outlook of the patient and their general condition much improved. Microscopically the lepromatous structure was gradually replaced by connective tissues and in one case there was a return to the indifferent type. The lepra bacilli became much reduced, granular forms became dominant

JAFFÉ R. Parasitosis intestinal como causa de muerte en Venezuela. [Intestinal Parasites as a Cause of Death in Venezuela.] *Rev. Sanidad y Asistencia Social* Caracas, 1945 Apr v 10 No 2, 283-92, [17 refs.]

The author has conscientiously tried to separate patients dying with and those dying from helminthic infestation. Many persons harbour *Ascaris* for example in large numbers without serious harm, whereas others with fewer may owing to migration of the worms or to their position, die from, say, liver abscess or suppurative cholecystitis. Again, *Necator* is common but among 3700 autopsies the author found 14 in which he is convinced death was due to this infestation: the worms were present in enormous numbers and there was fatty degeneration of the heart and intense anaemia. He does not exclude those who died as a result of taking carbon tetrachloride regarding such a fatality as due though indirectly to the infestation. The cause and effect sequence is less clear in some of the cases recorded: for example a child of 7 years with innumerable *Trichuris* in the large intestine and a fatty liver for the child had also tuberculosis of the hilar glands and of the spleen and schistosomes in the portal vein. Another had *Ascaris* and schistosomes also. *Enterobius vermicularis* if in large numbers may cause death, says the author but only indirectly through cachexia and secondary infection.

H. Harold Scott

BARLOW C. H. Une théorie sur la ponte de *Bilharzia haematobia*. [A Theory concerning Egg Deposition by *Schistosoma haematobium*.] *A. n. Parasit. Humaine et Comparée* 1949, v 23 Nov, 58 301-4

This theory is concerned with the method of egg deposition in the bladder wall by *Schistosoma haematobium* and the escape of the eggs to the lumen of the bladder. It is suggested that the female worm penetrates the capillary in which she is lying and lays her eggs in a small pocket or cyst in the bladder wall close to its inner surface. Having filled the cyst with eggs she returns to the capillary leaving a canal between capillary and cyst through which she returns again to refill the cyst with eggs when it has emptied itself. The eggs escape during micturition which causes the rupture of a weak point in the bladder wall near the cyst.

The theory is supported on various grounds. It is argued that if the eggs make their way slowly and fortuitously through the tissues from various levels, according to the procedure generally accepted at present they would be at different stages of development on arrival in the bladder lumen but this is not the case. The constant numbers of eggs which daily appear in the urine is also held to conform more with the new theory than with the old.

Clinical data in support of the theory are adduced from the results of examining urine collected during a single micturition in a series of centrifuge tubes of 50 ccm. capacity. It was noted that (1) the first part of the urine was clear with only a little fresh blood; (2) the next portion contained blood and a number of conical plugs of clotted blood which enclosed a few eggs mostly with inactive miracidia. Their appearance corresponded with the rupture of the cysts before the eggs are discharged; (3) the next portion contained much blood and some eggs. Evidently after the blood clots are expelled profuse bleeding occurs; (4) the last portion was inundated with eggs forced out of the cysts by muscular contraction of the bladder wall. The same sequence of events was observed with several repetitions of this procedure and also with the author's own bilharzial infection.

Evidence that the adult worms are situated very close to the spot where the eggs are evacuated from the tissues, was obtained from the author's own infection, in which a number of papules on the anal skin were found to be full

showed that all patients but one in each scale of dosage were passing viable ova, though there is an "impression" that the number was less than initially.

A. R. D. Adams

JANSEN P. La bilharziose intestinale dans la région de Tora (province orientale du Congo belge) [Intestinal Schistosomiasis in Tora, Belgian Congo.] *Ann Soc Belge de Méd Trop* 1948 Dec. 31 v 28 N 4 193-410 1 pl.

During a stay of two-and-a-half years in Tora which is situated on the border of Haut Ituri in the Eastern province of the Belgian Congo studies were undertaken of the schistosomiasis prevalent in the region. The area is a gold-mining one with over two thousand Africans employed in the industry. Much water is needed, and this is stored in large shallow barrages rich in vegetation, interconnected by canals. The conditions are therefore peculiarly suitable for snail propagation and *Planorbis* is very plentiful. Microscopical examination usually of single specimens of stool, showed 287 / 411 otherwise apparently healthy Africans to be passing *Schistosoma mansoni* eggs. 358 of these were adults of whom 86 per cent. were found infected and 51 were children, 73 per cent. of these being found to be infected. None of these Africans suffered from alimentary disorders. On sigmoidoscopy of 50 persons, 23 of them known to harbour parasites, no abnormality was observed.

On physical examination two-thirds of those known to harbour the parasite had an enlargement of the liver. Tests of liver function did not prove helpful in diagnosis and estimations of blood protein yielded inconclusive information. Biopsy showed schistosome ova in the liver to be surrounded by mononuclear cells and fibroblastic inflammatory reaction. The lesions appeared largely to be limited to a granulo-fatty degeneration immediately around the ova and well-defined liver cirrhosis was but rarely seen.

A. R. D. Adams

VAN DER KUIP E. Planorbidae Records of the Netherlands Antilles. *Ann J Trop Med* 1949 Mar v 29 No. 2, 254-61 18 refs.]

Tropicorbis *sauvignoni* Pilsbry is found on the islands of Curaçao and Bonaire. Other *Tropicorbis* species may also be present. *Australorbis plat anus inguavis* Wagner and *Helisoma d. r. melleolens* Pilsbry were imported into Curaçao from Venezuela. The *Australorbis* species was found only once in Aruba in an aquarium. Autochthonous cases of schistosomiasis have never been reported from the Netherlands Antilles.

SCHREIBER Freda G & SCHUBERT M. Experimental Infection of the Snail *Australorbis plat anus* with the Trematode *Schistosoma mansoni* and the Production of Cercariae. *J Parasitology* 1949 Feb. v 35 No. 1 91-100 1 fig (10 refs.)

The work described here was undertaken to obtain data of value to laboratory workers concerned with the chemotherapy of schistosomiasis in experimental animals and was designed to find out (1) the percentage of snail that becomes infected on exposure to miracidia under a uniform set of conditions (2) the time at which half the miracidia die under these conditions (3) the production of cercariae by infected snails under specific controlled conditions (4) the time at which half the infected snails die (5) the time at which half the cercariae die under a few specific conditions.

(1) Eggs of *S. mansoni* were obtained from faecal pellets passed by experimentally infected mice or hamsters and hatched after standing 1 to 7 hours in

water at 28°–30°C Snails were exposed individually to one or to 5–7 miracidia and examined for emission of cercariae 4 to 10 weeks after exposure Of 127 snails exposed to one miracidium each, 8 per cent became infected Of 1,698 snails exposed to 5–7 miracidia each, 50 to 60 per cent became infected

(2) Miracidia were placed in a number of beakers at 24° to 26°C and counted at intervals of 2 hours After about 8 hours half the original number were dead

(3) Counts of emerging cercariae were carried out for periods of 2 months on batches of infected snails, generally about 4 or 5 times each week The weighted average number of cercariae liberated per snail per day was 698, the range being 14 to 4,158 The liberation on Mondays (i.e., after 2 days' rest from stimulation) was usually higher than on other days Stimulation was by warming at 30°C or by warming plus illumination The combined stimulant increased the average emergence by 30 to 90 per cent of the emergence produced by warming alone

(4) The time after the first liberation of cercariae at which half the snails died was 4 weeks

(5) All cercariae incubated at 30°C were dead 20 hours after emergence and half were dead between 8 and 16 hours

J J C Buckley

LUTTERMOSER, G W & CASTELLANOS, J V Observaciones sobre la propagación y la destrucción del caracol, *Australorbis glabratus* Say, 1818, vector de *Schistosoma mansoni* (bilharzia) en el Valle, D F [On the Multiplication and Destruction of *Australorbis glabratus*, the Vector of *Schistosoma mansoni* along the El Valle River, Federal District, Venezuela.] *Rev Sanidad y Asistencia Social* Caracas, 1945, Feb, v 10, No 1, 109–48, 4 maps & 6 figs (5 on 1 pl) [25 refs] English summary

This question is of much local importance because the rate of infestation among the people is high, the vector abounds and there is a heavy contamination of the water-courses and their banks with excreta and many persons use this water A careful study extending over 3 years was undertaken to determine the prevalence of *Australorbis glabratus* in the Federal District of the State of Miranda in Venezuela Line maps show very clearly that for long distances of the main rivers this snail is not found, but in the lower reaches of the Valle River from Turmero to its junction with the Rio Guaire they abound, i.e., in the northern hilly districts of Venezuela, and here *Schistosoma mansoni* is endemic. The river bed here is less steep and the flow is less rapid, there is abundant algal and other vegetal growth the sewage of the population drains into it and the water contains much bicarbonate of calcium, all conditions favourable to the propagation of the snail In the dry season they breed copiously and in the wet season they are washed downstream to other parts

In dealing with this problem it was found that attempts to eliminate the vector from certain areas were, however successful temporarily, ineffectual in the long run because water coming down from the upper reaches resulted in re-infestation Two things were necessary to prevent the passage of infected sewage into the river and to start dealing with scourge at the head-waters first and then progress gradually downstream The intake site for irrigation must be carefully selected to prevent passage of the snails into the irrigation canals and these canals should be lined and kept clean Sand-filtration is not enough to remove infection from highly infested water for guinea-pigs were infested by water filtered through a depth of 100 cm of sand Photographs are

reproduced showing the state of the terrain which allows and fosters the propagation of *Austrocypris glabratus*

H. Harold Scott

LUTTENMOSER G. W. Estudios sobre el caracol vector del *Schistosoma mansoni* en la ciudad de Maracay y Alrededores (Estado Aragua) con recomendaciones para luchar contra el. (The Vector of *Schistosoma mansoni* in Maracay and Its Environs and Recommendations for dealing with it.) *Rev. Sanidad y Asistencia Social* Caracas 1945 Feb., v. 10 No. 1 149-63 17 figs. on 3 pls. & 1 map. English summary.

Maracay is the capital of the State of Aragua and lies north-east of the Valencia Lake. Nearly 100 places were selected for examination for *Austrocypris glabratus* the intermediate host of *S. mansoni*—rivers, drains, irrigation canals, reservoirs etc. and at 7 of them the snails were found, most in the unlined irrigation canals. In 16 of 31 unlined but in 3 only of lined canals. In these three there was much vegetation, so that the water-flow was obstructed. Where the flow was good and the canal kept clean the snails found no chance to develop. Only 1 175 specimens of the mollusc were collected altogether—a very small number—and in 3 only of the 7 samples were they found to be infested with cercariae of *S. mansoni*. These cercariae remain infective for some time because persons living 2½ kilometres below the place where the snails existed were infected. One place heavily infested was a tank supplied with well water—the snails probably gained entrance to the tank by plants carried there or by birds or in the material used for its construction. From the tank the canals became infested and, to eradicate the vector, it will be necessary to empty out all or nearly all the water, paint the whole of the inside with strong milk of lime and wash it well with a strong jet of water. A series of photographs shows some of the poorer dwellings, the district canals lined and unlined.

H. Harold Scott

JAFFE R. MAYER M. & PERAZO C. F. Estudios biológicos y anatomopatológicos en animales infectados con un solo sexo de *Schistosoma mansoni* (Biological and Pathological Studies in Animals Infected with Male *Schistosoma mansoni*). *Rev. Sanidad y Asistencia Social* Caracas, 1945 Feb., 10, No. 1 85-107. English summary.

Fant in 1927 stated that in snails collected in China in the dry season he found only male worms and he concluded that female worms were less resistant to inimical circumstances. In Caracas where a certain degree of moisture is maintained in the dry season by irrigation, no such preponderance of sex was observed. According to Gorges, Egyptian splenomegaly results from infestation by male worms. This the present authors could not confirm. Using guinea-pigs, rat and rabbits, they found a large spleen in a rat infested with female worms only and in a guinea-pig with male infestation only—yet again other animals heavily infested with both male and female might have normal spleens.

The pathological lesions of necrosis and pigmentation in the liver, the spleen, intramuscular infiltrations, endarteritis, peri-arteritis and phlebitis were the same in those infested with male worms only and in those infested with worms of both sexes. In fact of 30 animals infested by worms of one sex only (males) 8 showed necrosis of the liver whereas 9 out of 78 of those infested with both males and females showed this lesion. If one can draw any inference from so small a number it would seem that male worms are more likely to cause the necrosis, at all events the lesion cannot be ascribed to the presence of ova but is due to toxins secreted by worms of either sex.

H. Harold Scott

MAYER, M, LUTTERMOSER, G W & PIFANO C, F Investigaciones diagnosticas sobre la Schistosomiasis Mansoní en la ciudad de Maracay y Alrededores inmediatos (Estado Aragua) [Study of Infestation by *Schistosoma mansoní* in Maracay and its Immediate Neighbourhood] *Rev Sanidad y Asistencia Social* Caracas 1945, Feb, v 10, No 1, 165-74, 1 fig English summary

The following means of diagnosis of schistosomiasis in the Maracay district of the State of Aragua were used (1) History, including age, place of residence, contact with infested water (river, irrigation canals, wells), (2) Clinical examination and measurement of liver and spleen, (3) Examination of faeces, (4) Intradermo-reaction and, if this was negative, Fairley's complement fixation test

The numbers examined were small but the findings are, nevertheless, of interest Only 127 were examined, 76 of them school-children The intradermal reaction was carried out in all and in the cases of 7 suspected persons, who gave a negative to this reaction and faecal examination, the complement fixation test was made Of the 76 children, 42 were from 6 to 10 years of age and 3 of these had ova of *S. mansoní* in their stools, of 34 between 11 and 15 years 15 were positive Of 60 persons living in the suburbs of the town who were examined, 17 were below 15 years of age and 11 of them were passing the ova, 43 were over 15 years and 26 of them were passing ova, *i.e.*, 37 out of 60 Twenty-six had enlarged spleens, but, though malaria is present, it is believed that this symptom is more often due to the helminthic infestation In 4 only were malaria parasites seen (*P. vivax*) in whom the intradermo-reaction was negative This reaction was positive in 13 out of 40 school-children between 6 and 10 years of age and in 15 out of 30 between 11 and 15 years Fifty-five of the general (not school) population were tested by the skin reaction and of 7 below 5 years of age 3 were positive, 5 out of 8 between 6 and 10 years, 1 out of 5 between 10 and 15 years, and 26 out of 35 above that age

H Harold Scott

MAYER, M & PIFANO C, F El diagnostico de la schistosomiasis por intradermorreacciones con un antígeno preparado de vermes adultos de *Schistosoma mansoní* (Estudio fundamentado en 5000 intradermorreacciones) [Diagnosis of Schistosomiasis by Intradermal Reactions] *Rev Sanidad y Asistencia Social* Caracas 1945, Feb, v 10, No 1, 3-44, 5 figs [25 refs] English summary (10 lines)

This is a careful study and carried out with much attention to detail In an introductory historical account of the intradermal reaction in *S. mansoní* infestations the authors give due credit to Hamilton FAIRLEY as the pioneer in this work They describe in detail the method of preparing their own antigen which they call *Bilharzine* Early attempts were made with cercariae, collecting them in large numbers, centrifuging, sedimenting and filtering, but this was hazardous through handling the cercariae, they, therefore, devised a plan for using adult worms They prepare their antigen as follows At first naturally infested snails were used as they are abundant in Distrito Federal, but later they bred them from snails infested by human faeces or the livers of experimental animals The cercariae were allowed to penetrate guinea-pigs and rats whose abdomens had been shaved The latter seemed to be the more resistant to infection and guinea-pigs are to be preferred Forty days later adult worms were present in the liver and a little later still in the small vessels of the mesentery and walls of the intestine The animals were killed and the worms obtained by macerating the liver and the mesentery in saline A good yield would be 100 worms from a rat and 300 or more from a guinea-pig The

worms were dried, pulverized and suspended in phenolized saline. Later Coca fluid was used. This contains sodium chloride 0.5, sodium carbonate 0.05 (sodium bicarbonate 0.28 per cent according to Stitt) and phenol 0.4 per cent. subsequently merthiolate 1:5000 replaced the phenol. The strength of the suspension was about 500 worms in 3-4 cc. of fluid. It was placed in the ice-box for 5-8 days with frequent shaking and then centrifuged and filtered, first through paper and then through a Seitz filter. The product will keep for several months.

The reaction is graded thus: 0 where there forms a papule not more than 1 cm. in diameter with defined edges; \pm papule of diameter 1 cm., with irregular edge; + papule 1-1.5 cm., edges irregular; ++ 1.5-2 cm. papule edges irregular or with pseudopods; +++ 2.5-3 cm., similar in appearance. These are illustrated by diagrams and photographs.

Results—Positive in 163 out of 171 patients, 95.3 per cent. Of 253 controls not one was positive. Helminthiasis being common in Venezuela, the test was carried out on patients with cestodes and nematodes, but the results were negative. On infestation with other trematodes such as *Fasciola hepatica* a report will be issued later.

The test was made on 4045 unselected persons and 1,900 (46.9 per cent) were positive. 179 others (3-4) were doubtful. The positive figure is also the average of inhabitants of Caracas and its environs who harbor *S. mansoni*. A positive reaction may appear at any time from 18 to 35 days after infestation. Since the reaction persists for some long time even more than a year it is merely a proof of present or past infestation. Most of those reacting were between 20 and 40 years old.

Other tests were made with antigens similarly prepared but with male and female worms separately. According to a protocol in the paper 37 persons were tested with all three antigens male female and both. The results of the two former were not very discordant but the "male" antigen was little better than the "female" the bisexual was much the best of all. Another antigen used was one prepared from a liver with abundant eggs of *S. mansoni* part was treated with ether part was not. The ether treated antigen was rather the better but the Bulharszue of the authors proved by far the best of all. Another was made from an infected spleen but it was not of much value.

H. Harold Scott

MAYER M. & PIFANO C. F. La reacción de desviación del complemento según Fairley en la Schistosomiasis Mansonii. Estudio fundamental de 1832 reacciones. (Complement Deviation in Schistosomiasis mansonii. Rev. Sociedad's Asistencia Social, Caracas, 1935 Feb., v. 10 N. 1, 85-95 [25 refs. English summary].

This is a study of Fairley's complement fixation reaction and the authors' confirmation of its use and of methods derived from it. Comparing his (the authors') antigen from *S. p. male* with that prepared from the hepato-pancreas of *Australorbis glabellus* infested with cercariae of *S. p. male* with other means and also of uninfested snails. Those interested should consult the original for the paper is too full and congested for abstract and comprises a dozen printed pages. The result may be epitomized by saying that among 281 persons proved to be infested by demonstration of ova in the faeces 217 (81 per cent) were positive whereas among 120 from non bilharzial district and 51 suffering from other diseases such as malaria, ankylostomiasis, amebiasis, cancer of the liver, cutaneous leishmaniasis et non va positi. After course 1 tartar emetic 5 per cent of the positive reactors became negative. After second course 12 per cent were negative. The authors conclude: A positive test

does not signify that living worms are present at the time of examination. It is for the physician to decide whether or not the clinical symptoms presented demand treatment."

H Harold Scott

OTTOLINA, C & ATENCIO M, H Nuevos caminos para el diagnostico clinico preciso de la Schistosomiasis Mansonii [New Methods for the Accurate Diagnosis of Schistosomiasis mansonii] *Rev. Sanidad y Asistencia Social* Caracas, 1945 Feb, v 10, No 1, 185-215, 2 figs [Bibliography]

The new methods described and evaluated are two liver and rectal biopsy. Faecal examination for ova often fails and ova have been found for the first time after as many as 20 examinations. The complement fixation method of Farley is not specific in that it is given also by the Fasciolidae. Yet again, as is well known, infestation may persist after apparent clinical cure.

Liver puncture is described in minute detail, for which those interested should consult the original, if they are not already *au fait* with the procedure. The material obtained is digested in 4 per cent potash, after which the ova are easily found. It is known, however, that the female worms oviposit preferably in the inferior mesenteric veins and the eggs are found in the rectal walls, and the recto-sigmoidal region or the upper part of the rectal ampulla is usually particularly rich in ova. Again, the procedure for obtaining biopsy specimens from this site are detailed and illustrated. The ova may be seen in these specimens even when the liver biopsy proves negative, but in none of the authors' cases did the reverse obtain, the rectal biopsy was always positive if the liver had shown ova.

A table gives details of 12 patients, 8 had had no treatment and all were positive, one had received two courses and, with brief negative intervals, was again shown to be positive by rectal biopsy. Three had been treated and were regarded as clinically cured, nevertheless in only one was the cure confirmed by rectal biopsy, both the others showed ova to be present, in one there were 27, in the other 38 in a single preparation.

H Harold Scott

DA SILVA, L C T Splenectomy in Schistosomiasis mansonii *Puerto Rico J. Pub Health & Trop Med* 1948, Sept v 24, No 1, 69-89, 7 figs [Refs in footnotes] [Spanish version 90-103]

In the agricultural regions of Pernambuco, Brazil, it is estimated that from 36 to 50 per cent of the population suffer from infestation by *Schistosoma mansonii*. The number of patients with parasitic splenomegaly seen in the hospitals is increasing, though the diagnosis is not easily established, owing to the infrequency with which the schistosomes or their eggs are found in the parenchyma of the spleen. Sixty patients with splenomegaly were operated upon by the author during 6½ years. Examination of the faeces for schistosome ova was positive in 54 and in the remaining 6 the diagnosis was established by liver biopsy in 4 and by subsequent post-mortem examination in 2. The ages of the patients ranged from 10 to 44 years, with maximum incidence at ages 15-24. Ascites was present in 15 patients. The most frequent symptoms were diarrhoea in 74 per cent, general weakness in 76 per cent, fever in 67 per cent and epistaxis in 64.7 per cent. Haematemesis, due to rupture of oesophageal varices, occurred in 56.6 per cent. The Wassermann reaction was tested in 31 patients and proved to be positive in 14, this test may be strongly positive in *Schistosoma mansonii* infestations, even in the absence of syphilis [but no evidence is given to support this statement]. Splenectomy is indicated for the relief of portal tension and abdominal distension and for correcting leucopenia, repeated attacks of haematemesis constitute an urgent indication for operation.

Treatment of anaemia and helminth infestations precedes operation, but the author does not give a pre-operative course of antimony as he considers that in heavy infections it undermines the patient's resistance which needs to be high to withstand the operation. A course is however given after operation.

High spinal anaesthesia was used except in emergency operations for which general anaesthesia was preferred. A left mid-rectus incision with careful separation of all adhesions before ligation of the pedicle was the usual method of approach but for very large spleens a thoraco-abdominal incision was found to give better access. Post-operative haemorrhage from small vessels at the back of the stomach and spleen is a very real danger to be guarded against by careful haemostasis. Blood transfusion was only exceptionally given. There were 15 post-operative deaths in the series of 60 cases from internal haemorrhage haematemesis from oesophageal varices or from pulmonary complication. The best results were in young patients without cirrhosis or ascites and with over 3 million erythrocytes per cmm. and Hb. of 60 per cent. or more.

In a table a summary of the blood changes in 9 patients at intervals of one to 24 months after operation is given and compared with the condition on admission. All show improvement in both red and white cell counts.

W. L. Harnett

MARZOTTI, L. Aplicación de la intradermorreacción en casos humanos de infección por *Fasciola hepatica*. [The Intradermal Reaction in Human Infections by *Fasciola hepatica*.] *Rev. Inst. Salubridad y Epidemiol. Trop. México*, 1948, Dec. v 9 No. 4 257-61

The intradermal reaction with *Fasciola* antigen used in three patients infected with *Fasciola hepatica* gave frank positive results. The author in 1947 has already reported on equally satisfactory results with the same method in another human case.

H. J. O'D. Burke-Gaffney

CRANCE, M. R. A. & MANSOUR, T. L. A Kymograph Study of the Action of Drugs on the Liver Fluke (*Fasciola hepatica*). *Brit. J. Pharmacol. & Chemotherapy*, 1949 Mar. v 4 No. 1 7-13 4 figs. 10 refs.

"1. It is possible to obtain rhythmical kymographic records from fresh bovine flukes suspended in Ringer's solution at a pH range from 6.5-8.5. These movements are maintained for a period of 1 to 24 hours and frequently as long as 6 hours.

"2. The effect of known anthelmintics and of a number of other drugs, particularly those affecting the neuromuscular mechanism of vertebrates, has been tested on this preparation by allowing them to act for a maximum period of 45 min.

"3. At the end of this period the addition of amphetamine restores rhythmical activity provided the drug has had only a paralytic action on the fluke. In this way it has been possible to distinguish between stimulant, paralytic and lethal drugs.

"4. It is suggested that the possible reason why the chlorinated hydrocarbons are so effective as anthelmintics against *F. hepatica* is that they combine the stimulant action at low with the lethal at higher concentrations. A number of other anthelmintics have been shown to have other types of combined action.

"5. Comparison with the similar test in *Acanthamoeba* (Baker 1945) reveals that the liver fluke, as a representative of the platyhelminthes is sensitive to all the drugs which affect *Acanthamoeba* and in addition to umbelliferone, pelletterine extract, flurazepam, and certain others. The umbelliferone of this comparison is discussed.

HARANT, H., LAPEYSSONNIE, L. & LANCIEN Sparganose kystique chez un noir du Gabon [Cystic Sparganosis in an African from Gabon] *Bull Soc Path Exot* 1948, v 41, Nos 11/12, 666-7

An African patient from Gabon, French Equatorial Africa, was admitted to hospital in June, 1948, with a cystic tumour in the right lumbar region accompanied by pain on moving or bending the trunk, which had begun in 1943. The tumour, situated latero-vertebrally, was hard, about the size of a nut, and painful on pressure. Fluid could not be aspirated from it. There was an eosinophilia of 24 per cent, the Casati test was negative, faecal examination showed *Strongyloides*. The cyst was removed from the subcutaneous tissue under a local anaesthetic and on being opened revealed a flat worm 4 cm long which moved like a *Taenia proglottis*.

The authors comment on the geographical distribution and host localization of sparganosis generally and the difficulties connected with the accurate identification of plerocercoids, of which the present instance is an example

J J C Buckley

DOLD, H. & THEMME, H. Ueber die Möglichkeit der Uebertragung der Ascaridiasis durch Papiergeld [The Possibility of Transmission of *Ascaris* by Paper Money] *Deut med Woch* 1949, Apr 1, v 74, No 13, 409

The authors state the common methods of acquiring *Ascaris* infestation by eating raw or inadequately cooked fruits and vegetables which have been fertilized by human excreta. They then recall the work of DOLD and CHEN YU HSIANG of 30 years ago when they showed that typhoid, paratyphoid, dysentery, cholera and diphtheria organisms might cling to paper money and remain viable for a time. They wondered whether the ova of *Ascaris* might not similarly remain viable and be transmitted. They, therefore, tested whether ripe *Ascaris* ova on the fingers could be transferred to notes and *vice versa*, and next determined that these ova would live in an atmosphere of 50 per cent moisture at 18°C for some 5 weeks. Now, the average humidity in Germany in the middle of the year is 70-80 per cent [say the authors] and the temperature for development of the ova is 15°C. Paper money is usually carried in a trouser pocket or a coat pocket where the temperature is above 15°C. They took 20 old Reichsmark notes, much used and "correspondingly dirty", washed them in 40 cc of filtered and sterile physiological saline and the fluid was then centrifuged at a low speed for 5 minutes, in the deposit were found fertilized *Ascaris* ova.

H Harold Scott

DA SILVA, L. S. Ascariasis and its Dangers *Med J Malaya* 1948, Sept, v 3 No 1, 41-8

In the General Hospital, Singapore, approximately 25 per cent of the children admitted are infected with *Ascaris lumbricoides*. During three years (1939-41) the author performed 1,350 autopsies on children and he claims that no less than 73 of these children died of ascariasis.

This paper consists mainly of a tabulated record of these 73 cases. They include 14 cases of acute abdominal complications, there were seven cases of hepatic abscess, with lung abscesses in three of them, suppurative cholangitis with peritonitis in five cases, intestinal obstruction by a ball of roundworms, a perforated ulcer of the ileum, each in one case, there was also a case of otitis media with a worm in the Eustachian tube. Roundworms were present in the abscesses in all these cases.

The clinical picture of the less dramatic cases was that of secondary anaemia, followed by enteritis and often terminal pneumonia.

L E Napier

WILLIAMS W. J. SCHELLING V. & HARTMAN F. W. Action of some Alkylhydroxybenzenes on Pig Ascaris *in vitro*. *Amer J Trop Med* 1949 Mar. v 29 No. 2, 241-5 2 figs.

"Several new substituted alkylhydroxybenzenes have been tested for their ascaricidal properties both by the variable exposure method and the kymograph method.

"One of these 2-ethyl-4-chloro-6-hexylresorcinol seems to be more active than hexylresorcinol *in vitro*."

MALDONADO J. F. HERNÁNDEZ MORALES F. FOX I. & THILLET C. J. The Incidence of Filariasis bancrofti in Government Institutions for Children in Puerto Rico. *Puerto Rico J Pub Health & Trop Med* 1948 Dec. v 4 No. 2, 121-34 Spanish version 135-49]

A survey of the incidence of filariasis in three institutions for children in Porto Rico revealed by microfilarial examination percentage infection rates of 3.8 1.3 and 10.4 respectively. In the last group clinical evidence of the infection was slight. Examination of 693 mosquitoes collected in the building housing this group showed 14.7 per cent. of them to be infected. (Detail of these are tabulated.)

Of the mosquitoes collected from the three institutions 83 per cent. were *Culex quinquefasciatus* (C. *fat* genus) *Aedes sollicitans* and *Aedes aegypti* were infrequent and were never found to be infected. The mosquito survey indicated that although transmission of the parasite to the vector was occurring intensively, transmission from vector to human beings was more difficult.

J. J. C. Duckler

KERSHAW W. E. with a statistical analysis by R. L. FLACKETT. Observations on *Lilomacoides curvis* (Travassos, 1919) Chandler 1931. I. The Development of the First Stage Larva. *Ann. Trop. Med. & Parasit.* 1948 Dec. v 42 No. 4 37-99 7 figs. on pl. & 5 text figs. 26 refs.

From the aspect of experimental chemotherapy against filariasis in cotton rats, a complete knowledge of the normal behaviour and appearance of the microfilaria in all phases of its existence is very desirable. The present study was designed to fill a gap in the knowledge of the ethology, development and morphology of the larva of *L. curvis* from the time of birth to the appearance in the peripheral blood. Measurement and observations were made on the larvae in three different stages: those just emerged from the maternal host, those from the pleural spaces of the host and those from the peripheral blood.

The mean lengths of larvae numbering 200, 220 and 60 respectively from three female worms, were respectively 88.8µ, 88.76µ and 84.5µ. The mean length of 500 larvae from the pleura was 71.68µ and that of 500 larvae from peripheral blood was 77.93µ. There is thus an increase in length during the period of migration from the parent worm to the blood during which there is also an increase in nuclear complexity. Of special interest however is the shedding of a sheath—the stretched out vitelline membrane—immediately after the subsequent development of a true larval sheath during its migration in the peripheral blood. This is discarded in the gut of the insect vector when the larvae are ingested.

{In the light of these observations it should be necessary now to re-examine the nature and origin of the sheath in such forms as *W. bancrofti* which has been considered by early investigators and is therefore accepted by many not to be a true larval sheath, but to rely on an enclosing membrane derived from the egg shell or vitelline membrane.

J. J. C. Duckler

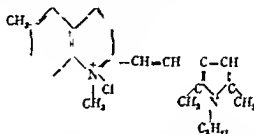
BUEDING, E **Studies on the Metabolism of the Filarial Worm, *Litomosoides carini*** *J Exper Med* 1949, Jan 1, v 89, No 1, 107-30, 2 figs [46 refs]

This investigation on the filarial worm *L. carini*, a natural parasite of the cotton rat, was undertaken to gain a better understanding of the mode of action of filaricides and hereby to aid in the selection of new therapeutic agents. For metabolic studies the worms were obtained from the pleural cavity of naturally infected cotton rats and were washed and maintained in a medium containing Na, K, Ca and Mg chlorides, to which was added a sodium phosphat buffer of pH 7.6. The metabolism and motility of the filariae were influenced by the nature and concentration of the metallic ions present in the medium as well as by its pH value. For respiration experiments, 15 to 25 mgm of worms in 0.8 ml of the above medium were used in a conventional Warburg apparatus at 37.5°C, with cups of 4 to 5 ml volume. The acids produced were determined before and after incubation as were also total carbohydrate and glycogen. It was found that the rate of oxygen uptake of the worms was increased in presence of glucose and remained constant over a period of at least 7 hours, during which time motility was preserved. Fructose and mannose acted like glucose whereas other common substrates including lactate and pyruvate did not. After a period of anaerobiosis, during which glucose was used up, oxygen uptake was not increased and in this respect *L. carini* differs from other helminths. Aerobically the glucose was converted to lactic and acetic acid and glycogen was synthesized. A polysaccharide other than glycogen was also present in the worms. During anaerobic incubation in presence of glucose, the polysaccharide content of the worms decreased and lactic acid was predominantly formed along with a small amount of acetic acid. Aerobically, lactate and pyruvate were utilized to a smaller extent than glucose. Respiration and metabolism were influenced to a considerable extent by fluoroacetate, iodoacetate, p-chloromercuric benzoate, cyanide and certain cyanine dyes. The latter group of substances have been shown by WELCH *et al* [this *Bulletin*, 1947, v 44, 1015] and by PETERS *et al* [below], to be effective chemotherapeutic agents in cotton rat infections with this parasite. The present author found that two substances (Chemotherapy-Centre Nos 348 and 863) were effective inhibitors at low concentrations and decreased the oxidative metabolism which is apparently essential for the survival of *L. carini*. Similar changes were noted in worms from cotton rats themselves treated with these substances. The chemotherapeutic action of the cyanine dyes in filariasis of cotton rats appears to depend upon their inhibitory effect on the respiratory metabolism of filariae. *J D Fulton*

PETERS, L, BUEDING E, VALK, A D, Jr, HIGASHI, A & WELCH, A D
The Antifilarial Action of Cyanine Dyes. I. The Relative Antifilarial Activity of a Series of Cyanine Dyes against *Litomosoides carini*, in Vitro and in the Cotton Rat *J Pharm & Exper Therap* 1949, Feb, v 95, No 2, 212-39 [16 refs]

The *in vitro* and *in vivo* action of certain cyanine dyes against the filarial worm *Litomosoides carini* of the cotton rat has been reported by WELCH *et al* [this *Bulletin*, 1947, v 44, 1015], and by BUEDING and also PETERS (*Ann New York Acad Sci* 1948, v 50, 115, 117). The activity appeared to be specific for that filarial species. CULBERTSON *et al* [this *Bulletin*, 1944, v 41, 772, 1945, v 42, 136] and other authors have used antimony compounds to treat this infection with some degree of success. In the present investigation a search has been made for filaricides, of non-metallic type, with activity against adult worms. Cotton rats naturally infected with *L. carini* used in screening

tests were treated intraperitoneally with an amount of drug approaching the maximum tolerated every 8 hours up to a total of 18 doses, in order to detect activity. The animals were killed 40 hours or longer after the last dose and adult worms, when present in the pleural cavity were removed to nutrient medium and observed at the same time as those from untreated cotton rats. THRENEW & BERTMAN (this Bulletin 1949 v 48 pp) have pointed out that results, obtained with wild cotton rats infected for an unknown period of time must be interpreted with care. The first compound to show marked activity was a member of the group of cyanine dyes—(1-aryl-2, 5-dimethyl-3-pyrrole) (1-6-dimethyl-7-quinoxaline)



dimethincyanin chloride which as a class possess tertiary and quaternary nitrogen atoms separated by a conjugated chain of C atoms (*i.e.* with alternating single and double bonds). This substance allotted the number 348, was very active and killed all adult worms either after repeated well tolerated doses or after a single dose near the maximum tolerated. With the antimony compounds Neostibosan and Anthiomaline on the other hand a cure could not be obtained. This substance 348 reduced the motility of adult *L. carinii* at a dilution of 1/1 million and affected their oxidative metabolism at a dilution of 1/40 million. Decrease in the respiration of mammalian tissues was affected only by a concentration 1,000 to 1,000 times as great. Cyanine dyes in general appeared to exert their effect through action on oxidative enzymes. All the drugs which were active *in vivo* were also active *in vitro* but the reverse was not true. BRIDING (above) has made an extensive study of the respiratory metabolism of filarial parasites, and his *in vitro* methods were used as an aid in screening new compounds. Many substances based on the model of 348 above and others of widely different constitution were studied as well as non-cyanine dyes with structural features similar to cyanines. None of the latter was active *in vivo* but some showed activity *in vitro*. The data given must be studied in the original. The authors consider that any substance active against filariasis in man would show both *in vivo* and *in vitro* activity against *L. carinii*. On that basis a number of substances have been selected for further study with a view to trial in the human disease. J. D. FULTON

VARGAS L. Notas sobre la oncoercerina. VII. Infección experimental de 5 mm. mm (Larva) mang. -ri con *Onchocerca volucri*. Notas on Oncoercerina. VII. Experimental Infection of 5 mm. mm (Larva) mang. -ri with *Onchocerca volucri*. Rev. Inst. Sal. Publ. y E. Formales Trop. Mexico, 1948 Dec v 9 No. 4 372-11

The English summary appended to the paper is as follows:—

A 5 mm. mm (Larva) mang. -ri female obtained by culture of *Onchocerca volucri* made in the town of Los Remedios Méx. at 2,645 mts. above the sea level, but

in the Laboratory of Mexico City a carrier of *Onchocerca volvulus* microfilariae, 124 hours after the infective meal the simulum showed sausage forms developing in the muscles of the thorax "

HIRCHCOCK, Dorothy J Artifacts in Transparent Adhesive Tapes used for Perianal Pinworm Swabs *Amer J Trop Med* 1949, Mar, v 29, No 2, 247-8, 2 figs

" A microscopical study was made of two brands of transparent adhesive tapes for artifacts resembling *Enterobius vermicularis* eggs. Very few artifacts, other than bubbles, simulating pinworm eggs were found "

BOYCOTT, J A An Improved Swab for the Detection of Threadworm Ova *J Clin Path* 1949, May, v 2, No 2, 149

The author describes a device for the detection of ova of *Enterobius vermicularis* which has been found to have some advantages over N I H swabs [this *Bulletin*, 1937, v 34, 878]

It consists of a wooden tongue depressor (6 in \times $\frac{3}{4}$ in) over the end of which is doubled a strip of Cellophane (3 in \times 1 in) held in place by several turns of a rubber band

The swab is rubbed along the peri-anal folds, preferably as soon as the patient awakes in the morning the pressure used should be just short of causing pain

The swab is placed in a paper envelope (about 2 in \times 4 in), bearing the patient's name In the laboratory, the Cellophane is opened out and attached to a slide by means of a drop of Canada balsam The areas showing epithelial and faecal debris are picked out microscopically with a $\frac{3}{8}$ in lens

The single crease in the Cellophane, the strength and the simple packing are improvements on the original N I H swab H J O'D Burke-Gaffney

HAND, E A & CRISWELL, R H Otitis Externa due to *Oxyuris vermicularis* *Arch Dermat & Syph* 1949, Feb, v 59, No 2, 249-50

The authors discuss some of the literature relating to external otitis and conclude that the rôle of fungi in the causation of this condition has been greatly overstressed Injudicious or excessive topical treatment of seborrhoeal, eczematous and related affections of the external auditory canal is a common cause of otitis externa and picking and scratching of the ears is a frequent habit in those affected

Enterobius vermicularis may be found occasionally in the nose and ears of persons in the tropics, infection being presumably carried by the nails The present case refers to such an infection It relates to an ex-officer of the U S Army who complained of pruritus and discharge from both ears This had been noticed first in Burma some months previously The patient had had no treatment and no history of previous ear affections or of pruritus ani

On examination, the ear drums were intact and hearing was normal There was scaling and erythema around the external auditory meatus and up the canals In a slight sero-ceruminous discharge from the ears, microscopical examination revealed many motile threadlike worms which were determined to be " a genus [*sic*] of *Ox. vermicularis* " No ova were found in the discharge, under the nails or around the anus No adult worms were found in the stool

The condition cleared up on cleaning of the ears with alcohol and the application of a few drops of 20 per cent benzyl benzoate in calamine lotion twice daily for two weeks

H J O'D Burke-Gaffney

ERHARDT A. Einige grundsätzliche Bemerkungen zur Wirkung von Oxyurenmitteln. [Fundamental Points on Measures for dealing with Enteroblasts.] *Deut. med. Woch.* 1949 Apr 1 v 74 No. 15 406-7

This is a contribution to Professor Rodenwaldt's 70th Birthday Festschrift. The author divides his subject into (i) aetiological action, i.e., drug treatment of the infesting worm (ii) prophylaxis. Under the first he mentions in particular oil of chenopodium, but notes that it is not sufficient merely to examine the faeces soon after and, finding no ova, to report the patient as cured. The worms may remain unexpelled for some time and search must be assiduously carried out for 4-5 weeks to prove death of the worms and even longer (up to 3 months) before one can be certain that all have been expelled. They may have lodged in the appendix and the drug may not have reached them in their hiding-place.

As for prophylaxis we must guard against auto-infection *per os* and also by inhalation of ova in dust. Treatment of the patients and so drying up the source of supply as it were and local application of some ointment to avert the itching and prevent infection of the fingers are obvious means for attaining this end.

H. Harold Scott

CARTER J. R. Plasma Cell Hyperplasia and Hyperglobulinemia in Trichinosis. The Duration of Larviposition. *Amer. J. Path.* 1949 Mar v 25 No. 3, 308-23 6 figs. on pl. 30 refs.]

"Viable adult trichinae including gravid females were observed microscopically in the small intestine of a fatal case of human trichinosis 115 days after the onset of symptoms. The patient was continuously hospitalized and under close observation for 87 days. Remission although remotely probable was considered to be adequately excluded. The period of persistence of living adult trichinae in the human intestine is the longest thus far recorded. The continued release of larvae over relatively long periods of time is of considerable significance from a clinical, prognostic and therapeutic point of view. The degree of infection as determined by counts with the trichinoscope is considered moderate to heavy.

"The diffuse plasmacytosis with associated hyperglobulinemia is considered to constitute an unusual, if not unique cellular response to trichinosis.

DEFICIENCY DISEASES

KATZ H. D. A Concept of the Etiological Complex of Deficiency States with especial consideration of Conditions. *Milbank Memorial Fund Quarterly* 1949 Jan. v 27 No. 1 5-97 3 figs. 48 refs.]

In this comprehensive examination of the aetiology of deficiency states the author emphasizes that nutritional deficiency is not necessarily synonymous with dietary deficiency. In the past much emphasis has been laid upon the relationship of diet to disease to the exclusion of sufficient consideration of all the other environmental conditions both internal and external, which govern the adequacy of nutrition at a cell level.

Many external environmental factors socio-economic (physical and chemical) in addition to simple dietary intake affect the adequacy of tissue nutrition and the internal environment may affect this adequacy through impairment of many metabolic channels and changes in many functions and reactions. As the author summarizes his able essay "It is possible that disease of

unknown cause may be nutritional in nature is not to be forthwith dismissed because it apparently is not the effect of dietary deficiency alone, rather, this contingency can be examined on broader aetiological grounds"

Dean A Smith

CORKILL, N L Dietary Change in a Sudan Village following Locust Visitation
Africa 1949, Jan, v 19, No 1, 1-12, 5 figs on 4 pls & 1 map [18 refs]

The population of the Fung area of the Anglo-Egyptian Sudan normally cultivate millet, cow-peas and sesame seed as subsistence crops, and they barter animals and milk products with cattle-owning nomads. In addition they have a number of valuable wild fruits at their disposal, and consume a considerable proportion of their millet fermented as beer. Their diet, as assessed in a series of seasonal surveys, in normal years, is entirely adequate by any standards.

In 1938 their crops were destroyed by locusts to a very great extent, and for the ensuing 8 months they were very short of their normal foods and used bush products increasingly. The main foods upon which they depended were guinea-fowl, gingerbread nut (*Hyphaene thebaica*), the desert date (*Balanites aegyptiaca*) and the cluster yam (*Dioscora dumetorum*). Evaluation of this partial famine diet indicated a small, possibly unimportant, deficiency in total calories, an almost adequate intake of fat, salt, nicotinic acid and ascorbic acid, but important deficiency of vitamins A, B₁ and riboflavin.

It was possible to carry out a clinical examination of the community in the famine area after 4 months of famine and after 8 months, at which time the Government stepped in with famine relief measures. After 4 months there was no evidence of major deficiency disease, but after 8 months all complained of pain in the belly and a sense of distension. These signs and symptoms suggest either poisoning from desert dates and dioscorine or vitamin B₁ deficiency, or possibly both. One case only showed neurological manifestations characteristic of dry beriberi, and thus, taken with the prevalence of digestive disturbance, abdominal distention and the presence of a buccal frieze, was considered to suggest that the population was on the brink of an outbreak of dry beriberi. [Some workers would not agree with the author's interpretation of buccal frieze as suggestive of beriberi.]

It is concluded from this most interesting series of observations that much can be done to insure against nutritional catastrophe from locust visitations, by growing a reserve root crop such as manioc, and by growing ground nuts.

Dean A Smith

SING, K G Nutritional Survey in Gandhi Nagar Camp, Jullundur *J Indian Med Ass* 1949, Jan, v 18, No 4, 96-9

A clinical nutritional survey was carried out upon 6,000 refugees from Western Pakistan, evidence of frank deficiency was found in 83 per cent. Enquiry indicated that the diets of these refugees had, at their homes, been satisfactory and that deficiency had only arisen in transit. Incidence was higher in adults than in children and in men than in women. The outstanding manifestations were those of deficiency of B complex factors, especially riboflavin, though cases of vitamin A deficiency and scurvy were seen.

Treatment of established cases with vitamin preparations was generally rapid and successful. Strong recommendations are put forward for improving the camp diet, including the use of germinated beans, nuts, vegetables, eggs and liver.

(73)

Dean A Smith

THOMSON F. A. Dietary Deficiencies in Children in the Island of Viti Levu. *Fiji Trans. Roy Soc Trop Med & Hyg* 1949 Mar v 42, No. 3, 48-52, 8 figs. on 4 pls. [21 refs.]

In the Island of Viti Levu Fiji, urbanization is rapidly spreading and there is a change from the traditional diet to a preference for sophisticated foods and tinned store-goods. White bread, sweet tea and large quantities of sugar are becoming the staple diet of most of the smaller children from weaning time.

A clinical survey of over 7 000 school and pre-school children carried out in 1947 has shown the effect of this change on the physical status of the children.

There was found no evidence of real starvation, the diet being apparently sufficient in calories, but there was evidence of deficiency of protein, vitamin A, factors of the B complex and seasonality of vitamin C. The most marked changes were found in the teeth and it was in the 5 to 8 years age group that the highest proportion (65 per cent.) of children showed these changes.

The earliest changes seen were defects of enamel with roughening and pitting which appeared to advance with discolouration and frank caries.

The changes attributable to vitamin A deficiency, mainly phrynodermia and xerophthalmia with Bitot's spots, responded well to treatment with cod liver oil and the scorbutic gums disappeared in the fruit season. Verrows of the skin was very common.

A serious aspect of the deficiencies discovered, though some of them are themselves of comparatively little consequence, is that they indicate a rapidly deteriorating diet in an area where good food is readily obtainable, particularly fish and fruit, and that they are undoubtedly associated with less evident and possibly irreversible changes and with lowered resistance to other diseases.

It is interesting to note that Gilbertese children, whose traditional staple diet of coconuts and fish had not suffered changes of sophistication, showed none of the effects recorded on Viti Levu.

[There is a minor confusion of terminology. The term *chilous* is usually now restricted to lesions of the vermillion of the lips, and the term *perlé* is used to describe the lesions at the angles of the mouth, synonymous with *angular stomatitis*.] Dawn A. Smith

TROWELL H. C. Malignant Malnutrition (Kwashiorkor). *Trans Roy Soc Trop Med & Hyg* 1949 Mar v 42, No. 3, 417-33, 8 figs. [Summ. & refs.] Discussion 433-47. [HIMSWORTH W. TAYLOR, McROBERT C. MCKENZIE A. CHESTERMAN C. C. SMITH D. BE. ET AL. VAPIER L. E. EARLY L. P. M. V. HARE K. P. TROWELL (in reply).]

Kwashiorkor has now been reported from many parts of the tropical and sub-tropical world, and there are indications of its occurrence in Southern Europe. It goes under many names and its presenting clinical features vary, but workers are increasingly in agreement that the essential features are growth failure, oedema, fatty liver and lowered plasma albumin, while commonly associated deficiency lesions include depigmentation of skin and hair, dermatous lesions of mucocutaneous junctions and diarrhoea.

The basic aetiology is becoming more evident: the disease starts at the time of weaning and is associated with low protein relative high carbohydrate diet. Weaning on to starchy gruels made from various cereals with no other source of protein, is common practice in many areas. There can be little doubt that the condition is one of nutritional deficiency of proteins, but this does not necessarily imply that the defect is dietary. We undoubtedly occur on a basis of pure dietary deficiency but parasitic, helminth and bacterial infections and infestation commonly accentuate or even cause the condition.

The pathology of the liver was studied by biopsy in 161 cases at Mulago Hospital, Uganda, and the sequence of changes has been traced from initial fatty infiltration through periportal fibrosis to diffuse cirrhosis of the Laennec type. Atrophy and fibrosis in the pancreas, and changes in the salivary glands have also been found.

Anaemia in uncomplicated cases is usually mild in degree, and normocytic and orthochromic in type. However, when there is heavy infection with malaria or hookworm the anaemia may be severe, and constant blood destruction and attempted regeneration produce high degrees of reticulocytosis and apparent macrocytosis.

Successful treatment depends on the administration of sufficient readily-available protein, milk proving more effective than meat or liver, and the careful eradication of all infections and infestations.

The author concludes that this disease, based either on dietary imbalance, heavy parasitization or a combination of the two, affects the majority of African children in some degree, and that its results, in non-fatal cases, lead to impaired development, subnormal function, diminished resistance to intercurrent disease and premature senility and death.

[The author has devoted many years to the study of this condition and contributed greatly to our understanding of it. This authoritative and well-balanced review is important and valuable. There is a comprehensive bibliography. See also this *Bulletin*, 1948, v 45, 633, 635, 724.]

The discussion was mainly centred on the interplay and relative importance of malnutrition and infection in the aetiology in Kwashiorkor.

WATERLOW made a valuable contribution in suggesting that organs most active in handling protein are most vulnerable to protein deficiency. Such organs are the intestines, pancreas and liver, and the concept of an initial defect of enzyme formation, with consequent defect of digestion and absorption, would explain much of the complex clinical picture and the difficulties of treatment.

Dean A. Smith

HARTZ, P. H. **Pancreatic Atrophy in Infants with Fatty Liver.** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam 1949, Mar., v 1, No 1, 41-9, 6 figs. [15 refs.]

In the disease of infants and young children now widely recognized and known as kwashiorkor or malignant malnutrition, and characterized by liver damage, hypoproteinaemia and anaemia, pancreatic changes have been described by several workers. DAVIES [this *Bulletin*, 1948, v 45, 633] in Uganda found fibrosis in many and atrophy in a few cases, WATERLOW [*ibid.*, 724] in the West Indies found atrophy of acinar cells, while MAGHALHÃES CARVALHO [*ibid.* 635] in Brazil and VÉGHÉLYI (*Lancet*, 1948, Mar 27, 497) in Buda-Pest found diminution in pancreatic enzyme secretion.

Microscopic examination of the pancreas was performed on 14 infants who had died with fatty infiltration of the liver. It was possible to obtain the post-mortem material very fresh. There was advanced atrophy of the acinar cells in all cases. The islet tissue appeared normal. The fibrosis, described by Davies in older children, was not seen in these babies. In a series of controls who died of intestinal or respiratory infection, or of undernourishment without severe fatty infiltration of the liver, no such severe pancreatic atrophy was found.

Although fatty infiltration of the liver is relatively common in Curaçao (49 cases in 249 autopsies) the "fully developed syndrome of fatty liver disease" [presumably characterized by the skin, hair and muco-cutaneous-junction lesions of associated avitaminoses—though this is not stated] is rare.

The author concludes that the primary lesion of this disease is in the pancreas and that fatty infiltration of the liver is secondary to it.

[Another interpretation of such findings has been put forward and was summarized in a leading article in the *Lancet* 1949 Jan. 29 188. Most workers are agreed that the main aetiological factor in the disease is protein deficiency in the presence of relative excess of carbohydrate intake. It is suggested that the organs most active in handling protein are also most vulnerable to protein deficiency—such organs are the pancreas, intestinal tract, liver and salivary glands, in all of which lesions have been described. Moreover much of the protein utilized by the gut, pancreas and salivary glands goes into the formation of digestive enzymes, the production of which is known to be impaired in fatty liver disease. Thus it may be considered, rather than that disease in one organ is secondary to disease in another, that there is based on deficiency of total protein or some protein components, failure of and damage to all those organs which utilize protein most rapidly. As these organs are mainly concerned with digestion and absorption this concept would explain the complexity of the clinical picture, the readiness with which secondary deficiencies occur, the variability in the results of treatment and the tendency to the establishment of a vicious circle.]

Dean A. Smith

SPRUE.

STEFANINI M. The Diagnosis and Pathogenesis of Tropical Sprue. *Acta Med Scand* 1949 Mar 31 v 133 No 2, 113-29, 1 Ag. [60 refs.]

This paper epitomizes a review of the sprue syndrome carried out in British India during the war on almost 6,000 cases of tropical sprue occurring among military units. The fundamental symptoms are represented by a particular defect of intestinal absorption which is especially detectable in the case of fats.

The progression of the case is closely related to intestinal malabsorption, and can be divided into three successive stages—a first in which the initial signs of impaired intestinal absorption predominate, a second in which secondary deficiency signs set in, and a third in which with the appearance of macrocytic anaemia the patient presents the complete picture of tropical sprue. The first two stages include also the mild and incomplete forms of the sprue syndrome.

In the author's experience the disease was found as frequently in Indians as in Europeans.

A partial defect of intestinal absorption of fats, which is usually detected earlier and more easily than that of any other dietary constituents, represents the basis for the diagnosis. The "fat balance" technique which the author describes probably represents the best method of study of intestinal absorption. Chemical analysis of the faeces usually shows high stearic/oleic with sphingomyelin/split fat ratio and soaps/split fat ratio higher than normal. The greatest part of split faecal fat in sprue appears to be present as soaps. Dietary deficiencies constitute the most important factor among those leading to the development of tropical sprue, but by itself it is not sufficient to explain all the peculiarities of the series of cases described in India during the war, such as the epidemic appearance in a particular period of the year and the sudden explosive high incidence among military units shortly after their transfer to special areas. It would appear that tropical sprue occurs epidemically whenever and wherever favourable seasonal, local and climatic conditions exist. P. Manon-Baker

BONNIN, H & MORETTI, G F De l'action élective de l'acide folique dans la sprue,
[Elective Action of Folic Acid in Sprue] *Bull Soc Path Exot* 1949, v 42,
Nos 3/4, 129-32

An account of 3 cases

HAEMATOLOGY

WROBLEWSKI, F, WEINER, M & SHAPIRO, S A Simplified Procedure for Blood
Cell Counts and Haemoglobin Determination *J Clin Path* 1949, May, v 2,
No 2, 138-40

TAYLOR, G F, CHHUTTANI, P N & KUMAR, S The Meat Ration and Blood
Levels Investigation of Indian Soldiers in Persia and Iraq, 1944 *Brit.
Med J* 1949, Feb 5, 219-21

Haematological investigations were carried out among Indian soldiers in Shaiba (Iraq) in 1944. The men were engaged on heavy pioneer work (44 hours a week) and were on Army rations of over 3,000 calories with over 80 gm of protein. Random samples of 40 meat-eaters and 42 vegetarians were taken for the investigations. The only difference in the rations, which consisted of rice or atta, dāl, ghee, tinned milk, onions, potatoes and fresh leafy vegetables (when available), was that in the former group a ration of 6 ounces of fresh mutton (with bone=4 ounces without bone) was given on 5 days a week.

The means of the red cell counts and of the haemoglobin estimations were significantly lower among the vegetarians, 4.67×10^6 and 14.32 gm, compared with the meat-eaters, 5.55×10^6 and 15.44 gm. The MCV was significantly higher 109.48 cμ in the vegetarians than in the meat-eaters, 96.33 cμ. The MCHC in both groups was low, 28.54 and 28.32 per cent (indicating a common iron deficiency). Eight of the vegetarians had red cell counts below 4×10^6 and two showed marked anaemia, below 3×10^6 .

The sternal marrow showed significantly higher percentages of megaloblasts, erythroblasts and macroblasts among vegetarians.

"There was no clear clinical difference between the two groups." "The vegetarians could often be distinguished by a tired look." Associated infections, malaria, bacillary dysentery and hookworm, were present in both groups. Three severely anaemic men from the vegetarian group were admitted to hospital for thorough investigation. In these no complicating infections were found although one had recently had bacillary dysentery. On the ordinary unit diet and rest in bed, the blood pictures of two of these men returned to normal within four weeks.

The authors conclude that, since the only constant aetiological factor in the production of the defective haematological state in the vegetarians was the absence of the weekly ration of 20 ounces of mutton, under conditions of hard physical work, diet alone unassisted by coincident infections, can produce macrocytic anaemia.

L E Napier

CHHUTTANI, P N A Report of 46 Cases of Anaemia in the Punjab with special reference to Nutritional Macrocytic and Addisonian Anaemia *Indian Med Gaz* 1948 Nov, v 83, No 11, 503-13 [14 refs]

The aetiological varieties and types of anaemia encountered in a series of forty-six cases in the Punjab are recorded. In 40 of the 46 cases studied, the

anaemia was classed as dyshaemopoietic. Of these 21 were cases of iron-deficiency anaemia and 14 deficiency of the haemopoietic principle. Of the latter 7 were nutritional macrocytic anaemia and 2 Addison's pernicious anaemia—these last 9 cases form the material on which this paper is based.

Two cases of nutritional macrocytic anaemia not complicated by malaria or splenomegaly had hyperbilirubinaemia comparable to that seen in Addisonian anaemia. These cases had marked anisocytosis comparable to that expected in Addisonian anaemia. This was regarded to be the possible explanation of the unusual finding of hyperbilirubinaemia.

"In these two cases the Price-Jones curves were indistinguishable from those seen in Addisonian anaemia.

"They fulfilled textbook criteria of Addisonian anaemia. Positive clinical evidence against a possible nutritional aetiology was forthcoming. Both were regarded to be instances of true Addisonian anaemia.

Differential diagnosis of nutritional macrocytic and Addisonian anaemia is discussed and it is concluded that the absence of intrinsic factor in the gastric juice of our suspected patients must be proved before the existence of Addisonian anaemia in India can be incontrovertibly established. A simple method to carry out this proof is suggested.

L. E. Napier

SMITH C. H. Detection of Mild Types of Mediterranean (Cooley's) Anaemia. *Amer J Dis Children*. 1949 Apr., v 75 No 4 505-27 8 figs. (1 map) [Refs. in footnotes.]

Cooley's anaemia is confined mainly to persons of Greek-Italian (principally Sicilian) and Syrian origin and the parents and siblings of patients with severe forms of the anaemia may show clinical and haematological evidence of the disease varying from this trait to a moderate form of anaemia. There are over 5 million persons of these origins in the United States and a recent investigation suggested that 1 in 25 of the Italians in the city of Rochester N.Y. had a mild form of the disease.

The present report is based upon the investigations in 47 families with Cooley's anaemia. Clinically persons with the trait or a mild form of the disease may show none of the classical features the facies, the skeletal changes, cardiac enlargement and murmurs, and pains in the joints but in mild cases there may be pallor and splenomegaly.

The changes in the blood on which the diagnosis depends are as follows:—

Blood smear and blood count show hypochromic macrocytes, basophilic stippling, oval and target cells, polycythemia.

Morphologic changes in erythrocytes as far in excess of the degree of anaemia.

Resistance of the red cells to haemolysis in hypotonic solutions of sodium chloride is increased.

"Iron or other forms of antianaemia therapy fail to restore normal blood levels."

Figures are given showing the incidence in the 47 families. In 33 families both parents were examined—in every instance of a severely anaemic child both parents had a mild form of the disease or showed the trait and when one parent only was examined, that parent showed the trait. In every instance where there were siblings, one or more were affected. In every instance of a mildly anaemic child or a child with the trait at least one parent was affected, and when there were siblings at least one was affected. The first-born child most frequently escaped the disease or the trait.

Of the various names suggested the author prefers Mediterranean (Cooley's) anaemia with the qualifications mild, moderate or severe.

The author concludes with a plea for a more thorough investigation of the disease, and especially of mild forms, in the recognized countries of origin of this disease and in other countries from which severe cases have been reported

L E Napier

LONDON, I M SHEMIN D, WEST, R & RITTENBERG, D Heme Synthesis and Red Blood Cell Dynamics in Normal Humans and in Subjects with Polycythemia Vera, Sickle-Cell Anemia, and Pernicious Anemia *J Biol Chem* 1949 May, v 179, No 1, 463-84, 9 figs [27 refs]

DICKSTEIN, B, LANDMESSER, W E, Jr, LOVE, W E, WILSON, T H & WOLMAN, I J The Osmotic Resistance of Human Erythrocytes in Normal, Carrier and Anemic States with special reference to Changes due to Age, Race, Sickle-Cell Anemia, Mediterranean (Cooley's) Anemia and Congenital Hemolytic Icterus *Amer J Med Sci* 1949, Jan, v 217, No 1, 53-61, 6 figs [28 refs]

The authors adopted a method of measuring osmotic resistance of erythrocytes which was suitable for photographic reproduction. The solutions that they used were 0.18 M glycerol in 0.36 per cent NaCl, 0.24 M thiourea in 0.18 per cent NaCl, 0.47 per cent NaCl, and 0.36 per cent NaCl. They tested the osmotic resistance in 170 normal and 90 abnormal persons.

They found that in normal white children up to 10 years of age the osmotic resistance was greater than in white adults, but that in negroes this difference did not exist. The normal resistance of the negro is greater than that of the white man. These differences make it essential that control examinations should always be made with the blood of persons of a comparable age and colour group.

In sickle-cell anaemia the osmotic resistance is higher than in the normal negro, in the sickle-cell trait it shows an intermediate position.

In Mediterranean (Cooley's) anaemia, the osmotic resistance is greater than in the normal person, in the carrier (person showing the trait) the erythrocytes show a slightly greater degree of resistance than in the patient with the anaemia.

In congenital haemolytic icterus a markedly lower degree of resistance is shown, the method detects increased fragility in cases in which the ordinary methods do not.

The osmotic resistance was tested in several other anaemic states including iron-deficiency anaemia and pernicious anaemia and found to be within normal limits.

L E Napier

CALLENDER, Sheila T E, NICKEL, J F, MOORE, C V & POWELL, E O Sickle Cell Disease studied by measuring the Survival of Transfused Red Blood Cells. *J Lab & Clin Med* 1949, Jan, v 34, No 1, 90-104, 8 figs [15 refs]

Employing the DACIE and MOLLISON (*Lancet*, 1943, May 1, 550) technique, the authors studied the time of survival of red cells in sickle-cell disease. Normal cells transfused into subjects with sickle-cell anaemia survived normally. Cells from patients with sickle-cell anaemia transfused into normal subjects or into another patient with sickle-cell anaemia showed a shortened average time of survival, the curves showed a sharp fall, indicating the rapid destruction of half or more of the cells within 10 days, followed by a slow decline to the zero line which was reached in about 60 days indicating a much slower destruction of the remaining cells.

Cells from a healthy subject with the sickling trait transfused into normal subjects or patients with sickle-cell anaemia survived normally.

Oxygen inhalation (70-80 per cent.) slowed the rate of destruction of sickle-cell anaemia cells in one subject with sickle-cell anaemia but not in another. The survival time of trait cells in a cyanosed boy with congenital heart disease was normal.

The findings indicate that the defect in sickle-cell anaemia is inherent in the red blood cell. There is evidence to suggest that sickling is not, as has been thought, a function of age of the cell but that the cells in sickle-cell anaemia vary constitutionally in their liability to sickle. It is suggested that the difference between the anaemia and the trait is qualitative and not simply one of degree.

L. E. Asper

WILLIAMS, A. W. & MACKAY, J. P. Rapid Determination of the Sickle Cell Trait by the Use of a Reducing Agent. *J. Clin. Path.* 1949 May v " No. 2, 141-2.

There is need for a simple and accurate technique for determining the sickle cell trait which will serve for rapid exclusion of sickle-cell anaemia in practice and which can be used for uniform survey work. The authors refer to the deficiencies of the sealed wet preparation and also to various improved methods but some of the latter are complex and not suitable for the clinical sick-room. In 1928 HARRY [this Bulletin 1928 v 3 1001] and later SHERMAN (*Bull. Johns Hopkins Hosp.* 1940, v 67 309) showed that sickling only occurs in those having the sickle cell trait when corpuscular haemoglobin is in a reduced or dissociated state—the change is accelerated by a low pH.

The authors sought an acid reducing agent which would cause rapid dissociation of oxyhaemoglobin and hence reveal sickling in a short time without causing damage to the red cell in isotonic solution. Sodium hydrosulphite (dithionite $\text{Na}_2\text{S}_2\text{O}_4$) was selected and was found to fulfil these conditions admirably.

A 2.1 per cent. aqueous solution (in freshly boiled distilled water allowed to cool) was found to be isotonic and to have a pH of 6.4. Sodium hydrosulphite is a powerful reducing agent which decomposes in moist air—a solution will not keep indefinitely and the 2.1 per cent. solution is therefore made once weekly and kept in small bottles sealed with liquid paraffin. A tube should be discarded at the end of the day on which the seal has been removed.

For the test a drop of the isotonic sodium hydrosulphite solution is taken up in a fine Pasteur pipette and about one-sixth of this quantity of blood is drawn up in apposition to it. The whole is expelled on to a clean slide and rapidly mixed. The slide is inverted on to a cover slip (which need not be sealed) and examined under the 15 in. objective. The same pipette may be used for any number of patients, if it is rinsed in saline.

If the sickle-cell trait is present sickling occurs in 3 to 15 minutes and rapidly becomes generalized—it usually appears earliest in cells near the edge of the coverslip. If no sickling occurs after 20 minutes the blood may be pronounced negative for the sickle-cell trait. Sickling never occurs in normal blood (after half an hour red cells may, however, become crenated).

This technique was compared with the wet sealed preparation (read at 48 hours) in the case of 100 African schoolboys. There was complete agreement between the methods. The new technique always gave the result in 20 minutes while the sealed wet preparation sometimes gave doubtful results after 24 hours. (The numerical results will be published separately as part of a survey.)

The authors consider this technique to be superior to other in current use as regards speed, simplicity and reliability.

In a footnote, reference is made to the work of THOMAS and STETSON (*Bull Johns Hopkins Hosp*, 1948, v 83, 176) which was noticed by the authors since their paper was sent for publication. The authors quoted found a saturated solution of hydrogen sulphide to be the most reliable and rapid agent for demonstrating sickling, among sulphhydryl compounds which they tried. The present authors believe that sodium hydrosulphite has practical advantages as to odour, stability and preparation of the solution.

H J O'D Burke-Gaffney

SCOTT, R B, CRAWFORD, R P & JENKINS, M. Incidence of Sicklemia in the Newborn Negro Infant. *Amer J Dis Children* 1948, June, v 75, No 6, 842-9, 1 fig

The blood of 262 negro infants selected at random, were tested for the sickling trait by the coverslip method. One drop of blood in isotonic saline was placed under a coverslip surrounded by petrolatum and examined after 24 to 48 hours at room temperature. On the first day of life, 7, or 2.6 per cent, gave a positive result. Of the total, 133 were tested again on the third day of life of which 3, or 2.2 per cent, were positive, and 129 were tested on the fifth day of life of which 6, or 4.6 per cent, were positive. Two that gave a negative test on the first day became positive by the fifth day, so that a total of 9, or 3.4 per cent, showed the sickling trait in varying degrees. In every case a blood count showed the haemograms to be within the normal range.

Two hundred and nine older children were tested, of these 16, or 7.6 per cent, showed the sickling trait. Blood counts were done in 7 of these children and 2 were found to be anaemic and were diagnosed as active sickle-cell anaemia.

Three children showing the trait in infancy were tested again at 7, 11 and 17 months, and in all these cases the percentage of sickling was increased, from 20, 10 and 40 to 29.2, 37.0 and 85.8 per cent, respectively. L E Napier

VENOMS AND ANTIVENENES

AHUJA, M L & BROOKS, A G. Mode of Action of Russell's Viper (Daboia) Venom. *Indian J Med Res* 1948, Apr, v 36, No 2, 173-80, 1 graph.

"1 Experimental evidence strongly supports the view that daboia venom consists of only one fraction of any pathological importance, i.e. a strong blood-coagulant fraction.

"2 Histological examination of tissues of animals dying of daboia-venom poisoning show that there is extensive deposition of fibrin in capillaries. This deprives the circulating blood of its fibrin content rendering it incoagulable. Such incoagulable blood is itself a coagulant proving that no 'anti-fibrin ferment' exists in the venom."

GRASSET E. Standardization of the Cobra (*Naja flava*) Antibody. A Comparative Study by the Method of Assay at various Levels and by the Selected Antivenene Single-Level Method. *Bull World Health Organization* Geneva 1949, Mar, v 2, No 1, 69-83, 1 fig

SERGEANT, Et. Étude comparative du venin de scorpions mexicains et de scorpions nord africains [Study comparing the Venom of Mexican Scorpions with that of North African Scorpions]. *Arch Inst Pasteur d'Algérie* 1949, Mar, v 27, No 1, 31-4 1 fig

The authors method of studying scorpion venom is probably known to readers of this *Bulletin*, but may be briefly recapitulated. The telson is removed,

dried at 37°C. and kept in the dark in a sealed tube. For testing it is ground in a mortar and the resulting powder is macerated for several hours in 0.9 per cent. sterile saline with glass beads and repeatedly shaken. White mice are the experimental animals used and the injection is made subcutaneously. The m.l.d. for mice of 20 gm. of the venoms of the North African scorpions is

<i>Prionurus australis</i>	1/20 of a telson
<i>Prionurus amoenus</i>	1/5 " " "
<i>Prionurus hoggerensis</i>	1/1 " " "
<i>Buthus occiduus</i>	1 " " "
<i>Hottentotta gentili</i>	1 " " "
<i>Scorpio maurus</i>	7 telsons

The first-named is thus much more toxic than the others.

Two Mexican scorpions *Centruroides noxius* and *C. limpidus limpidus* have been studied in the same way. Their telsons are much smaller than that of *P. australis* about half the length and breadth and one-third to one-fourth the weight. The fatal dose for the white mouse is in each case one telson (8 mgm.). *C. noxius* is rather the more toxic of the two $\frac{1}{2}$ telson (4 mgm.) kill one out of two mice whereas with $\frac{1}{2}$ (2 mgm.) and even $\frac{1}{4}$ (1 mgm.) of *C. limpidus* both survive. The fatal dose of *P. australis* is 1.5 mgm. as compared with 8 mgm. of *C. noxius* or *C. limpidus*.

Next the cross-effects of the antivenins (prepared from the horse) were compared. The *P. australis* antivenin saved 9 out of 10 mice injected with an otherwise fatal dose of the venom of this scorpion or of *Buthus occiduus*. A boy of 8 years was stung by the latter and in a few minutes became comatose; he was saved by a subcutaneous injection of 20 cc. of *P. australis* antivenin.

Similar tests with Mexican scorpion antivenins showed that they were much more potent against the Mexican venoms than was *P. australis* antivenin and, vice versa, *P. australis* antivenin was much more potent against its own venom than were the Mexican antivenins although the Mexican venoms were much less toxic than the North African species. With the *C. noxius* venom and Mexican antivenin 31 mice survived out of 50 with *P. australis* antivenin only 13 out of 50 with *P. australis* venom and Mexican antivenin 25 out of 50, whereas with *P. australis* antivenin 85 per cent. survived 47-48 out of 50. There is therefore some fundamental difference between the North African and the Mexican scorpion venoms. H. Harold Scott

DEL FORT, E. C. Ressemblances et différences dans les actions physiologiques des venoms des scorpions. [Similarities and Differences between the Physiological Actions of Scorpion Venoms.] Arch. 1 st. Pasteur d'Algérie 1949 Mar., v 77 No. 1 35-R. [13 refs.]

The author states that the actions of different scorpion venoms are very similar. Injections of large doses of *Centruroides limpidus* venom for example which is the least toxic of the Mexican scorpion venoms produce the same effects as the more toxic *C. noxius* and *C. suffusus*. EPGENT has shown (see the preceding abstract) that the venom of *P. australis* and *C. noxius* are antigenically distinct, although according to the present author the physiological effects are the same—fibrillation, clonic convulsions, rise of arterial pressure, salivation and paralysis of the movements of respiration. He shows that the muscular movements are due to the action on the motor neurones and not to action on the muscle fibres themselves for though the convulsive movements are produced by direct contact of the venom on the muscles, the series is intact; there is no such movement if the nerves to the muscle are severed. The rise of blood pressure is similarly due to the action of the venom

on the spinal cord, on the sympathetic preganglionic neurones of the vessels and the suprarenals. Some organs deprived of their nerve-supply show vasoconstriction which is not seen when the suprarenals are extirpated. The respiratory paralysis is of central origin and is preceded by a long period of irregularity in depth and rate of respiration. Hitherto the interpretations have been varied, some attributing the effects to peripheral action, others to bulbar, others again to neuro-muscular blocking.

H Harold Scott

DERMATOLOGY AND FUNGUS DISEASES

FOX, H. Cutaneous Manifestations of some Tropical Diseases. *Arch Dermat & Syph* 1949, Feb, v 59, No 2, 127-44, 5 figs

This is a lecture delivered at the Ninety-seventh Annual Session of the American Medical Association in Chicago in June, 1948.

The author talks of certain tropical diseases with skin lesions which he had met with among soldiers and sailors returned from the late World War. He deals with five only: yaws, pinta, bartonellosis (*verruca peruviana*), cutaneous leishmaniasis and leprosy. He notes that 32 cases of yaws had been reported from the Army and 24 from the Navy and Marine corps. He does not say how many cases of pinta he has seen, but confines himself to general remarks on the disease and its history. Of oriental sore, 499 cases had been reported from the American Army in the Middle East, probably contracted in Persia. Of Carrion's disease six cases in the Navy and Marine Corps were reported in the war, and of leprosy 22 among veterans. This number is, unfortunately, likely to go up as cases with long incubation declare themselves.

There are excellent photographic reproductions of patients with pinta and *verruca*. [The paper contains nothing with which readers of this *Bulletin* are not familiar.]

H Harold Scott

GUIMARÃES, F. N. & RODRIGUES, B. A. O puru-puru da Amazônia (pinta, carate, mal del Pinto etc.) Contribuição ao seu estudo. [Mal del Pinto in Amazônia, Brazil.] *Mem Inst Oswaldo Cruz* 1948, Mar, v 46, No 1, 135-97, 24 figs & 1 map [107 refs]

Puru-puru, a local name for pinta, or *mal del pinto*, has been given various explanations. One that it was a disease affecting those living on the banks of the Rio Puru, others that the name is a corruption of "pirú-porú", itself a corruption of *pirera-poroc*, signifying a "skin which desquamates". The authors give a long list of those who have studied the condition down to the time when Chagas said that it and pinta were one and the same, and investigations in the last 30 or more years have served but to confirm this. They next briefly note the existence of this disease, first outside Amazônia and then in more detail the distribution within the Amazonas, particularly along the rivers Negro, Japurá, Solimões, Javari, Juruá and Purus, and a line map shows this clearly. There follows a detailed description of the clinical features with photographs of patients and photomicrographs of sections of the skin showing the lesions set up. The dyschromic lesions are of three forms: i. Papulo-squamous with severe itching, and edges well defined; ii. Maculo-squamous, larger, paler, with at times, pigmented centres; iii. Dyschromodermic maculae, with pigmentary changes more or less marked, but with little desquamation.

Epidemiological data are based on 69 cases only, hence the facts stated must be accepted guardedly if applied generally. In one district, Labrea, of 28

patients 16 were between 10 and 30 years of age whereas in another group 36 patients 18 were between 5 and 15 years. Sex plays no part of the 69 there were 34 males, 35 females. As regards race of the total 74 were blacks 19 whites 16 were Indians and 10 were mulattoes. Of 41 in Labrea and Povoado Belém 34 belonged to 8 families (but this might just as easily be explained by a common origin as to a family susceptibility). The pathological anatomy is well illustrated by tissue sections. The paper concludes with details of 47 cases. Neosalvarsan gave the best results in treatment. *H. Harold Scott*

MASSOUD C. F. I. D. The Radiological Picture of Mycetoma. (Report of a Case verified by Biopsy). *J. Roy. Egyptian Med. Ass.* 1949 Jan., v. 32, No. 1 64-8.

"1. A case of mycetoma of the foot is clinically and radiologically described. The diagnosis was ascertained by a biopsy examination.

"2. At some stages of the disease (not at the start) the radiological picture may suggest the condition. This may be seen in the reported case. The multiple cyst like areas of bone destruction etc., and the exclusion of pyogenic osteomyelitis, tuberculosis, syphilis, and malignancy suggest a condition of a fungus infection.

"3. The reported case presents a slight degree of new bone formation. This is not usual because the common findings in this condition show that it is mainly destructive.

STEWART C. B. Histoplasmosis Sensitivity in the Maritime Provinces and Newfoundland. *Canad. J. Pub. Health* 1949 Apr. v. 40 No. 4 178-82. [11 refs.]

"1. Histoplasmin tests were done on 310 Dalhousie University student most of them males.

"2. Positive reactions were observed in 4 men (1.3 per cent) all of whom had been part time residents of areas outside the Maritime Provinces or Newfoundland.

"3. No positive reactions were observed in 157 life time residents of the Maritime Provinces or Newfoundland.

ALLEN R. M. Experimental Histoplasmosis: Portal of Entry of the Fungus. *Amer. J. Trop. Med.* 1948 Nov. v. 29 No. 6 837-61.

The mode of infection in histoplasmosis is not known, but the frequent occurrence of lesions on the oral mucosa and in the lungs suggests an oral or pulmonary portal. Experimentally infection is easily achieved by inoculating cultures into susceptible animals by the venous or peritoneal routes but apparently there is no previous record of successful inoculation by the oral or nasal routes.

The author using living yeast form cultures of *Histoplasma capsulatum* attempted to infect guinea-pigs (12) and mice (36) through the alimentary system by adding suspensions of the fungus to drinking water and guinea-pigs alone through the nasal route by introducing the culture suspension through fine urethral catheter for this purpose it was necessary to anesthetize the guinea-pigs to prevent their struggles. Mice could not be used in this experiment because of their small size. Very large doses of culture were used in all experiments with the object of obtaining fatal infections.

In the oral feeding experiment 17 of the 36 mice died in less than 30 days and the remaining 18 were sacrificed between the 22nd and 36th days.

Macroscopic lesions were not shown but the fungus was recovered in culture from the organs of 70 per cent of the animals. Of the 12 guineapigs in this experiment, 4 died and the remaining 8 were sacrificed. The fungus was cultivated from the organs of 75 per cent of these animals.

In the nasal experiment, none of the 12 guineapigs died and all were sacrificed at the end of two weeks or later. By culture, 75 per cent of the animals were found to be infected.

The results of these experiments indicate the possibility of infection by the nasal and alimentary routes.

J T Duncan

NORDEN, A. Agglutination of Sheep's Erythrocytes sensitized with Histoplasmin. *Proc Soc Exper Biol & Med* 1949, Feb, v 70, No 2, 218-20.

SASLAW and CAMPBELL [below] showed that collodion particles in suspension could be sensitized with histoplasmin and agglutinated by a *Histoplasma* antiserum. The present author, following the technique of MIDDLEBROOK and DUBOS (*J Exper Med* 1948, v 88, 521), used a suspension of sheep erythrocytes in place of the collodion particles. The optimal dilution of histoplasmin for sensitizing the cells was found to be 1:2, but undiluted histoplasmin was haemolytic to sheep erythrocytes. A 0.2 per cent suspension of erythrocytes could be more effectively sensitized than the 0.5 per cent suspension previously recommended.

Erythrocytes sensitized with histoplasmin were agglutinated by anti-*Histoplasma* rabbit sera but not by anti-*Sporotrichum*, anti-*Candida* or normal rabbit sera. Cross-reactions with anti-*Blastomyces* serum were not attempted.

In recording the tests, a positive result was indicated by the deposition of erythrocytes as a thin adherent film on the hemispherical fundus of the test tube, while a negative result was shown by a flat disc-like deposit of free erythrocytes. The serum end-titre in a positive reaction was as high as 1:1,280.

J T Duncan

SASLAW, S & CAMPBELL, Charlotte C. A Comparison between Histoplasmin and Blastomycin by the Collodion Agglutination Technique. *Pub Health Rep Wash* 1949, Mar 4, v 64, No 9, 290-94.

In a previous paper (*Proc Soc Exper Biol & Med* 1948, v 68, 559) the authors showed that a suspension of collodion particles "sensitized" with the soluble antigens of histoplasmin could be agglutinated by a *Histoplasma* antiserum. The present paper is a report of the application of this serological method to the study of the specificity of the *Histoplasma* and *Blastomyces* serum reactions. The degree of sensitizing power varied amongst the different batches of histoplasmin, and for each there was an optimal dilution which achieved the highest degree of sensitization of the collodion particles. The results of the tests showed that *Histoplasma* antiserum could agglutinate histoplasmin-sensitized collodion suspensions up to serum dilutions of about 1:160 and 1:320, and blastomycin-sensitized suspensions to a lower serum end-titre. The *Blastomyces* antisera were relatively poor in antibody and agglutinated the blastomycin- and histoplasmin-sensitized suspensions only to end-titres of 1:10 and 1:5 respectively.

So far, the results confirm the earlier findings that an intimate antigenic link exists between *Histoplasma* and *Blastomyces*, evidenced by the cross-agglutination reactions, but the serum end-titres in the homologous systems are higher than those in the heterologous systems.

J T Duncan

KUZMA J. F. Histoplasmosis—the Pathologic and Clinical Findings. *DIAGNOSIS of the Cases* 1947 July—A 5 v 13 No. 4 335-44 [11 refs]

Report of a case in Milwaukee Wisconsin.

BASS H. E., SCHOMER, A. & BERKE R. Coccidioidomycosis. Persistence of Residual Pulmonary Lesions. *Arch. Intern. Med.* 1948, Dec., v 82, No. 6 519-28, 7 figs.

Little is known of the subsequent histories of cases of coccidioidomycosis which have not progressed to the stage of disseminated granulomatous disease and are presumed to have achieved complete recovery. The large number of infections estimated at 8000 in the United States Forces during wartime training in the endemic areas of coccidioidomycosis in the south-western part of the United States, has provided abundant material for a "follow-up" investigation. In this connexion, the authors were able to study in New York city 20 patients who had protracted residual pulmonary lesions of coccidioidomycosis and they give brief summaries of the clinical features of 13 of the cases. Radiography showed pulmonary lesions of various types e.g. nodular densities, cavities, mottled infiltrations, fibrosis, pleural effusion and calcification. The resemblance of many of the lesions to those of tuberculosis was striking and it is not surprising that the disease had, in several cases, been diagnosed as tuberculosis after the patient's return to civil life. However, these residual lesions characteristically showed no change during a period of observation of from 2 to 5 years. The diagnosis of coccidioidomycosis was based on the following evidence: (a) the history of exposure to infection in an endemic area (b) radiography which showed a pulmonary lesion, usually a solitary cavity or nodular density which remained unchanged during months of observation (c) indication of an identical lesion in the X-ray picture of the chest at discharge from military service (d) a positive coccidioidin skin reaction and (e) failure to find the tubercle bacillus. Skin sensitivity to coccidioidin tends to diminish with lapse of time and although a dilution of 1:1000 is usually sufficient to give a strong reaction in an early case, it was necessary to use the reagent at 1:100 or even 1:10 in the residual cases. The reactions also were rather weak in contrast with the strong reactions given by early cases. Despite the pulmonary lesions described, all of the patients were asymptomatic except three—one being a patient with cavity and recurrent haemoptyses, another with pleural effusion and the third with a progressively disseminating disease. In the cases with cavity there was no evidence of bronchogenic spread or of seeding to other parts of the lung field such as occurs commonly in tuberculosis.

J. T. Dukes

HEAT STROKE AND ALLIED CONDITION

O'DRISCOLL J. J. Tropical Anhidrotic Asthenia: Its Definition and Relationship to other Heat Disorders. *Arch. Intern. Med.* 1949 June 81 No. 6 700-031 1 fig. Refs. in footnotes.

Until recent times little has been known of the ill-effects which may be due to increasing impairment of sweat function arising during residence in tropical countries where malaria rubra (prickly heat) is of common occurrence.

The disorder called tropical anhidrotic asthenia is characterized by exhaustion, headache and dyspnoea associated with failure of sweating over large areas of

the body when working in the heat. Sweating may be profuse on the face but markedly diminished over those covered areas of the body where prickly heat is most commonly found. The condition is held to be due to the occlusion of the sweat ducts and the extravasation of sweat into the tissues. The paper contains a very full discussion of symptoms and signs. Details of 38 severe cases are compared with those given by other workers, in particular the cases of heat exhaustion type 2 described by LADELL *et al* in Iraq [this *Bulletin*, 1945, v 42 143].

The question of terminology for this disability due to post-malarial obstructive impairment of sweat function, as distinct from the classic heat disorders is considered in some detail. It is thought that the development of this disorder constitutes a specific form of tropical deterioration which limits the duration of an individual's acclimatization to residence in the tropics. G P Crowder

TROPICAL ULCER

ADAMSON, P. B. Tropical Ulcer in British Somaliland. *J Trop Med & Hyg* 1919, Apr v 52, No 4, 68-76 [19 refs.]

The author considers that present data show that tropical ulcers are probably caused by "Vincent's fusio spirochaetes in a host who has become susceptible to infection as a result of vitamin-B deficiency and possibly further debilitated by chronic disease and malnutrition" (BLANK, this *Bulletin*, 1947, v 44, 935). Tropical ulcers occur in Somaliland throughout the country, from the cold highlands of Laigayo to the hot and moist areas around Berbera.

In 1947 out of a total of 7,737 in-patients 999 were treated for this condition (135 being women), an unexplained feature being the relative infrequency in women as compared with men. It is probable that patients only attend a European doctor when the ulcers are very severe, or where a proper hospital lies within a convenient distance. A large number of early cases are probably attended by local practitioners, who are of the Midgan (sweeper) class. In treatment by these Midgan the ulcer is cleaned as well as possible with a rag or other material powdered bark of an unidentified *Acrothus* (Glover) called in Somali the *lilis* tree is made into a thick paste or applied dry and the whole area covered by a layer of mud which is left in position until it drops off or the patient decides to remove it. Alternatively powdered white catkins from *Leucaena glauca* Fork are used. In a personal statement to the author it was claimed that *lilis* bark cured 50 per cent of ulcers the time taken for cure not being stated.

The author draws the following conclusions —

1. Trauma was an almost constant predisposing factor.
2. No cases of tropical ulcer in females were found at Hargriss during the period of investigations (February to July 1948). The poorer classes were more likely to be affected than the richer ones. Age was unimportant except that very young children seemed to be exempt.
3. Associated diseases were not significant except to lower the general resistance and the anaemia present was considered to be merely a nutritional defect. The Kahn test may be positive in tropical ulcer.
4. There was a diminution in the plasma level of vitamin C in cases of tropical ulcer but oral vitamin C (ascorbic acid) was of no specific use. Reticulocytosis and raised blood sedimentation rates occurred.
5. In 10 per cent of cases there was a periostitis or bone necrosis which delayed healing and it is considered that the fusiform bacilli are responsible for this condition.
6. The most sensitive indicators as regards prognosis were the smears from ulcers and plasma vitamin C levels; the blood sedimentation rate and reticulocyte count were also useful guides.
7. Hospital diet was considered to be below the optimum standard and should be adjusted to a higher level of vitamin C while protein may be required to be increased. At present the only source of vitamin C is camel's milk. Officially each patient receives a pint of milk daily but in practice usually a good deal less was available. After the rains have begun the vitamin C content of camel's milk averages 2.678 mgm. per 100 ml.

(For details and results of the various laboratory investigations the reader is referred to the original paper.)

C. F. Skellern

MAGARA M. GO H., SO K. & AKIUE, T. On a New Species of Anaerobic Cocci Isolated from Tropical Ulcer. *Japanese Med J.* 1949 Aug. v. 1 No. 4 289-91 2 figs.

From 19 specimens from tropical ulcers the authors in Japan isolated an anaerobic coccus from ten. It was also isolated from two ulcers produced experimentally by inoculation of secretion of tropical ulcers into other persons. The coccus was isolated more frequently in the early stages subsequently it was possible to isolate it from almost every case.

The organism is a Gram-positive non-motile non-sporing coccus usually appearing in diplococcus form and having a diameter of about 1.5 to 1.8 μ . It is strictly anaerobic. The cultural characters are given in detail and they suggest as the authors point out, that the character of the diplococcus resembles that of *Diplococcus magnus* (Tissier and Martelli) but differs from it in producing black pigment in culture on 1% bouillon with liver pieces and also in being pathogenic to animals. Broth cultures injected intradermally into rabbits and guinea-pigs produced ecthyma and from the resulting abscesses the diplococcus was found in pure culture.

Serologically the coccus was agglutinated both by patients' serum and normal serum.

In 143 strains of cocci isolated from the female genitals and oral cavity only 1 strain of *Diplococcus magnus* was found and no cocci identical with the diplococcus now described were found.

The authors suggest that the diplococcus is rarely found except in tropical ulcer and since spirochaetes and fusiform bacilli are not confined to tropical ulcer it is suggested that this diplococcus is the essential cause of tropical ulcer. They have therefore named it *Diplococcus tropicus*. This interesting

observation merits further investigation but in view of the small series of cases and the inconclusive serological findings, the basis for giving the organism this specific name is perhaps a little uncertain] *H J O'D Burke-Gaffney*

VAN ZANTEN, T V Beenverlenging bij het ulcus tropicum [Elongation of the Leg in Tropical Ulcer] *Nederl Tijdschr v Geneesk* 1949, Feb 5, v 93 (1), No 6, 408-9

The English summary appended to the paper is as follows —

"In sufferers from low-seated ulcera tropica, the leg is often elongated. The cause is not clear. The author expects the phenomenon to disappear on the availability of better nutrition and better medical care."

HALAWANI, A Desert, Septic, or Veldt Sore in Egypt *J Roy Egyptian Med Ass* 1944, Aug, v 27, No 8, 214-36 [19 refs] [Recd 13 Dec, 1948]

During 1943 and 1944 there were outbreaks of ulcer in several towns in Egypt, including Port Said and the author saw approximately 500 cases. They were of the type usually called septic, desert or veldt, some were very septic and assumed a phagedaenic character. The former were "punched out and circular in outline with undermined edges and thickened margins", whereas the more septic cases were progressive and showed finger-like extensions and often exposed underlying bone.

C diphtheriae was isolated in 7 out of 32 cases, but, as in many cases the ulcers had already been swabbed with formalin, it is believed that this was the main causal organism. Staphylococci, streptococci, *Proteus*, *P pyocyanea*, spore-bearers, and fusiform bacilli, the last-named in 4 of 60 cases, were also isolated.

An ulcer was produced in a guinea-pig by inoculating *C diphtheriae* into the flank with a small dose of antitoxin into the peritoneum at the same time, and in an Egyptian hedgehog (*Ermaceus auritus*) an ulcer was produced by inoculating material from a case showing fusiform bacilli, but attempts to produce ulcers in animals by inoculating other micro-organisms were unsuccessful.

The author believes that malnutrition is a predisposing factor. Most patients were on a poor diet deficient in protein, vitamin A, nicotinic acid, and riboflavin. The vitamin-A content of the blood was always very low. Serum calcium and blood urea were within normal limits, but the blood sugar was often low and curves flat.

Syphilis was a commonly associated infection and the Wassermann reaction was positive in 28.5 per cent of cases.

Nutritional defects were corrected and concomitant diseases treated, diphtheria antitoxin was given where indicated, and sulphanilamide powder was applied. Some dramatic results were obtained with the last named. The popular formalin-swab method was also used. The ulcers are cleaned up quickly by this method but their duration was not cut short, this is a very cheap form of treatment.

L E Napier

MISCELLANEOUS DISEASES

LAMPRELL, B A Tropical Neurasthenia *Med J Malaya* 1948, Sept, v 3, No 1, 34-40

The author during a long tropical service has seen a distressing number of cases of tropical neurasthenia including a number that ended in suicide.

The condition is common in Malaya of which he is writing. In a group of rubber plantations with an average staff of 75 (presumably Europeans) in the past two years one has committed suicide eight have been repatriated for nervous breakdown, and two have been sent on home leave for the same reason. In a series of 31 invalidings analysed by SQUIRES (no reference given) 45 per cent. [15] were for psychological reasons.

Neurasthenia in the tropics differs from that seen in practice in temperate countries by the predominance of cerebral over spinal symptoms. The mild cases show increased irritability with occasional outbursts of uncontrolled rages restlessness and moderate amnesia. In the intermediate cases these symptoms are worse and periods of worry and depression occur often amounting to delusions of persecution with insomnia. In the severe cases the depression is predominant to this is added procrastination and indecision, loss of confidence fear of insanity and of loss of employment which constitutes a vicious cycle that may end in suicide.

The author classes the causes as personal and environmental the former being the more important. The prominence of the personal factor is due to the tendency for social misfits and others who are dissatisfied with home conditions to seek employment in the tropics where they hope to find life easier. The environmental factors are (i) Exile from one's own country and loss of firm roots in a place that one calls home. (ii) The excessive stimuli of the tropics under this heading the author includes the direct effects of the climate and discusses the sexual factor. (iii) Overwork and excessive responsibility. (iv) Isolation and monotony. Under this last heading (the sequence of thought is obscure to the reviewer) he includes a suggestion that the recent increased rate of breakdown in Malaya may be due to years of war strain and present economic and political difficulties.

The preventive measures he advocates include more careful selection of candidates for service in the tropics and the suggestion that a psychiatric assessment as well as a physical examination should be made. More frequent home leave annual local leave to a hill station shorter office hours more security of tenure of appointments in commercial undertakings and freedom to marry early in his service. Finally the author suggests that since the problem is an admittedly serious one the Malayan branch of the British Medical Association should make a study of its aetiology and prevention and convey their conclusions to the Government and to commercial and industrial associations.

L. E. A. 717

GARCIA CARRILLO, E. El corazón en relación con algunas enfermedades tropicales [The Heart in certain Tropical Diseases.] *Rev Med Costa Rica*, 1948 Aug., v 15, No. 172, 193-6. (7) refs.

A short review of the literature.

AYRT F W. Some Observations on the Anterior Lobe of the Pituitary Gland in the Adult Male African. *East African M. J.* 1949 Mar. 28 No. 3 85-88

AYRT S R. Eosinophilic Lung. *India Med. G.* 1948 Dec. 83 No. 1, 451.

An account of 4 cases treated with either ephedrine or celvarian, with satisfactory results.

THÉODORIDÈS, J Les coléoptères parasites accidentels de l'homme [Accidental Infestation of Man by Beetles] *Ann Parasit Humaine et Comparée* 1948, v 23, Nos 5/6, 348-63 [39 refs]

Beetles or their larvae are sometimes recorded as having been taken from some part of the human body. Their presence is accidental as they are not parasitic on man. In a brief review of the published records the cases are grouped according to the site of infestation: (1) the digestive system, (2) the ear, nose and eye, and (3) the genito-urinary system.

A table is given summarizing the data concerning sixteen species.

H S Leeson

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

CONGO BELGE Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge Rapport sur l'Activité durant les années 1946 et 1947 [DE BRAUWERE, P] [Report of the Activities of Foréami during 1946 and 1947] 140 pp, 3 maps & 3 diagrams [Recd 1949] Brussels 112 Rue du Commerce

The war-time experiences of the excellent Belgian organization Foréami were reviewed in the Report for the years 1939 to 1945 [this *Bulletin*, 1948, v 45, 816], which also sets out the general pattern of its organization. The present report covers the early stages of recovery and the preparation of plans for expansion. Work originally started in extremely unhealthy areas of the District of Kwango is now being stabilized in that district and in small areas of the Districts of Moyen-Congo and Lac Leopold II, divided into six sub-sectors with a total population of 624,600 people. The work includes the taking of an original census of the whole population, the medical examination of every person in his home, reinforced where necessary by laboratory procedures, and the preparation of a medical card for each. Each year the census is revised and as high a proportion as possible of the medical examinations repeated, 86 and 88 per cent having been re-examined in the years under review. In this way exceptionally valuable data are collected on the prevalence and social importance of different diseases, and on demographic happenings. In association with this survey the sick are treated either locally or by despatch to a hospital centre, public health education is carried out, and both general and special sanitary measures are instituted. The sick who report for treatment independently of their discovery in a survey process are also treated and constitute the bulk of patients.

The organization has now passed through its infancy. Much has been learnt by the survey process and public confidence has so increased that there is little remaining need to search for the sick. In the process of stabilization the survey will recede from its position of paramount importance to one of secondary importance in comparison with medical treatment and the improvement of health. The old dispensaries, once a local marvel, are now giving place to fully equipped hospitals in each sub-sector served by more elaborate rural dispensaries which have themselves some of the characters of hospitals, and staff are being transferred from survey to strictly clinical duties.

The commonest causes of morbidity and mortality are diseases of the respiratory and alimentary systems with nutritional conditions running them close. There was a remarkable absence of epidemic disease, the sole one worthy of notice being an outbreak of amoebic dysentery which proved unusually resistant to specific treatment [the statement that chiniofon "*semble être un*

mélancolie de premier ordre" in the treatment of this disease is not borne out by the data given. The state of the major endemic diseases is less satisfactory though trypanosomiasis (reviewed separately in this *Bulletin* 1949 Oct. v 46) has greatly decreased malaria remains a scourge demanding control by all possible means, while the helminthiases and nutritional deficiency diseases remain of the greatest importance. Yaws of which 75 new and 145 old cases were seen has sunk to a position of minor importance though previously extremely common and fortunately the incidence of tertiary cases reflect the present rather than the past incidence of primary cases. Leprosy remains common 0.4 per cent of the population being affected, and the standard methods of control by voluntary or compulsory isolation which have failed, are now being replaced by the establishment of a model village with a high standard of amenities to which patients will be attracted by treatment with the new drugs. Tuberculosis is a serious problem to combat which the five-year plan proposes to institute BCG vaccination mass miniature radiography and a model sanatorium. Venereal diseases are not very common. Helminthic infections are universal ankylostomiasis being the commonest, but the author makes refreshing comments on the excessive readiness of practitioners to attribute illness to this cause when others are responsible. Among all these various causes of sickness however the author focuses attention on the importance of malaria, which practitioners tend to regard as a mild disease but which he considers enhances the infant mortality in the absence of prophylactic treatment by about 150 per thousand. Against malaria Fortnam is instituting a control system based on house-spraying (the insecticide is not stated, but pyrethrum can be inferred) and on the wide use of prophylactic paludrine and chloroquine.

Demographic data are fully tabulated. During the war the birth rate dropped and though there was no marked increase in mortality other than the infantile mortality the population actually decreased in some areas. The position is now fully restored and the death rate is lower than any previously recorded. The following basic statistics for 1947 are either directly given or can be deduced from the tables—birth rate 41.24 per 1,000 crude death rate 23.75 natural increase 15.49 infant mortality rate 83.4 per 1,000 births fertility rate 176 and net female reproductive rate 1.3. The age distribution of the population and the mortality per 1,000 in each age group in 1947 were—

Age	Percentage of population in the group	Mortality per 1,000 per year
0-5	11.1	74.4
5-15 (inc. 14-14)	39.7	15.0
15-45 (15-44)	47.6	19
45 and over	6.6	67.0

The death rates by age groups are very high, roughly double those of India their nature being obscured in the crude death rate by the abnormally young age constitution of the population. Nevertheless the high fertility rate balances them and if this still continued, the population would be rapidly growing. (The reviewer is sceptical about the accuracy of the infant mortality rate which does not tally with the mortality in the 0-5 group but accepts the other figures as at least good approximations. The data given are unique for tropical Africa.)

The report concludes with notes on experimental work on paludrine and chloroquine prophylaxis and on the experimental human infection.

[For earlier accounts of the organization of Foream, see TROLLI, this *Bulletin*, 1940, v 37, 521, and HUMPHRIES, *ibid*, 523] G Macdonald

INDIA *Annual Report of the Malaria Institute of India for the Year 1947* [SINGH, J., Director] 19 pp 1948 Delhi Manager of Publications, Civil Lines

The Malaria Institute of India reports a successful year's work in 1947 despite the need for its staff to undertake much emergency work necessitated by refugee movements. Work must also have been impeded by several changes of staff exemplified by the fact that three Directors during the year are named.

Courses of instruction continued on a normal basis and a special one for engineers has now been standardized. Many papers have been published, and interesting points in the research programme dealt with laboratory trials of the prophylactic value of Cam-Aqi and resochin (chloroquin) against *Plasmodium knowlesi*, in which Cam-Aqi given in doses of 20 mgm daily for one week subsequent to inoculation proved effective in two monkeys. Field trials with paludrine showed it to be a highly effective therapeutic agent under Indian conditions, 0.1 to 0.3 gm effecting a clinical cure in most cases, and a prophylactic trial in which three dose regimens, approximating 300 mgm once a week, were employed was very successful. The notable feature of the work is the increasing amount of responsibility for routine malaria control in the Province of Delhi, in Coorg and in the coalfields. G Macdonald

HINMAN, E. H. *The National Malaria Society Past, Present, and Future.* J. *National Malaria Soc* 1949, Mar., v 8, No 1, 1-13, 1 fig

The National Malaria Society owes its origin to a resolution at the Pan-American Scientific Congress in 1916 which led to the formation of a Committee, whose objectives were (a) to stimulate interest in malaria problems, (b) to serve as a medium through which societies and individuals might become identified with the study and prevention of the disease, and (c) to co-ordinate the efforts of these agencies with constituted Federal, State, and local authorities. Until 1941 the Committee had an extremely varied career and was only successfully maintained through the activities of a few enthusiastic persons. In 1941, however, its constitution was radically changed and the National Malaria Society was formed in the place of the previous Committee, the Society undertaking the publication of the *Journal* which has now become well known.

With this change the Society has steadily prospered and undertaken much work in the co-ordination of malaria control activities both for the armed forces and the civilian authorities. In reviewing future prospects its officers foresee the possibility of its disintegration on the unique grounds that its objects may shortly be completely fulfilled by the disappearance of malaria from the United States. In this paper the writer reviews its place and considers the possibility of fusion with a society interested more generally in tropical medicine, following the example of the International Congresses. [Considering its recent successful career and the value of the *Journal* the arguments would seem to be strongly in favour of continued existence with interests extended from the United States to the tropical world.] G Macdonald

SHANGHAI *Rapport sur le fonctionnement technique de l'Institut Pasteur de Chang-Hai en 1948* [FOURNIER, J., Director] [*Annual Report of the Pasteur Institute, Shanghai, for the Year 1948*] 46 pp, 1 fig 1949

The first of the five parts into which this Report is divided deals with general laboratory investigations. Routine examinations are shown in detail in tabular

T. alani was not found in Malaya, Sumatra, Java, or the Philippines and so was regarded as not being a vector of the tropical variety of the disease [But Col. Ando to whom we are indebted for the copy of the report states that *T. alani* is common in Selangor where it as well as *T. deliusi* is definitely a local vector—he also states that the Japanese had many more cases of scrub typhus than are mentioned in the report—for example several thousand cases in Upper Burma whereas the only important outbreaks listed by the author are as follows—Kabanjar, Sumatra (80 cases in April, 1943), North Irrawaddy River bank (several hundred cases in October 1943), Atjeh, Sumatra and Phuket, Siam (more than 100 in each, in December 1944).]

At first the disease was not recognised, it was called Tensa (bushy wamp) fever. In October 1943 a rickettsia was first isolated from a patient by H. Tazui who described the disease as an unknown fever but the strain when examined by the author at Singapore in February 1944 was found to be *R. orientalis*. Even then the Japanese doctors who had seen tsutsugumushi disease in Japan believed that they were dealing with a different disease—they regarded the presence of an initial ulcer as an essential feature of the Japanese disease.

The author has carried out a remarkable thorough investigation which does him credit even though the chief importance of the experience of the Japanese medical men in connexion with scrub typhus is to serve as a striking example of the misconceptions that result from failure to recognise the wide range of variability of the disease.

John H. D. Meyer

TROPICAL DISEASES BULLETIN

Vol 46]

1949

[No 9

SUMMARY OF RECENT ABSTRACTS*

VII HELMINTHIASIS

[Continued from p 695]

NEMATODES

Hookworm infection, Strongyloides, Trichostrongylus, etc

ORLANDI (p 530) shows that in the rural population of Milan hookworm infection is fairly common (7 per cent of a large number examined) and *Ascaris* and *Trichuris* infections even more so. Women are more commonly engaged than men in market gardening, and work barefoot, they show higher rates than men. He describes the symptoms of the infection.

JENKINS (p 199) found hookworm infection in over 80 per cent of Papuans at Port Moresby, by direct and flotation methods.

In recent years there has been a great reduction in hookworm incidence in Florida, but HOOD (p 262) still finds that 40 per cent of white children are infected, though the infection is heavy in only 3.9 per cent. There is a sharp improvement in the rate at about the age of 20. The danger that service men who served abroad during the war may introduce hookworm infection into the United States is discussed by LOUGHLIN and STOLL (p 722). They estimate that *Ancylostoma duodenale* was acquired by 2-30 per cent of men, according to the theatre of war in which they served, but they also note that infection by *Necator americanus* was present in 18 per cent of men recruited from some southern United States. This reflects poor hygienic conditions, in which it may be possible that *Ancylostoma* may be established.

BENAIM PINTO (p 99) estimates that more than half of the people of Venezuela harbour hookworms. He describes cardiovascular disturbances in a group of patients with severe hookworm anaemia, some of the patients had other diseases, but some were regarded as having uncomplicated hookworm anaemia, and the cardiovascular disturbances were attributed to this cause.

KHOO and CHIANG (p 625) refer to previous descriptions of radiological changes in the small intestine due to hookworm infection, and describe the appearances in three of their own cases. Details should be sought in the original abstract.

BECMEUR (p 450) succeeded in eliminating hookworm infection from a group of miners in Morocco by treating all the moderately and heavily infected men.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1948, v 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

with tetrachlorethylene and by constructing effective trench latrines below ground so sited that no worker had to go more than 400 metres to use one. HERNÁNDEZ LIRA (p. 262) uses oil of chenopodium, hexylresorcinol and tetrachlorethylene in the treatment of hookworm infection. He gives details of dosage. In the Philippines it has been customary to give castor oil at the same time as oil of chenopodium but some prejudice has arisen because toxic symptoms were sometimes produced. GUTSARA (p. 277) notes that there were other ingredients in the mixture and he therefore tested the matter in cats and found that castor oil actually reduced the toxicity of chenopodium and he therefore advises that they should be taken together.

Benzene is used in veterinary medicine in Anatolia but is not pure. HAYAL (p. 802) has used a pure form in various worm infections of man with some success. There are slight symptoms of intoxication and burning sensation unless the dose is small.

It is noted that in the Philippines monkeys are the usual hosts of *Strongyloides* (p. 801) argues that geographical races of *Strongyloides* exist which vary in their capacity to infect dogs and cats. He cites instances to support his opinion.

LIE HIAN JOE (p. 99) reports *Tr. strongyloides* and *T. stercoraria* in considerable proportion of post mortem examinations in Indonesians and Chinese in Java. *T. stercoraria* was much more common than *T. strongyloides*. They did not give rise to symptoms in man but there was transient eosinophilia. O'NEAL and MAGATH (p. 802) report 3 cases of *T. strongyloides* infection of man.

LISSOS and B. REOLA (p. 1100) describe a case of infection with *Symptomatic* *Strongyloides* a rare parasite of man.

Ascari Trichuris et.

In the Cape Verde Islands hookworm infection is very common and *Ascaris* and *Trichuris* are also often found. A parasite is present in small numbers of people (Dr. MIRA *et al.* p. 1067). FLOCH and Dr. LAJONIE (p. 627) have made a survey of intestinal parasites in French Guiana. Comparing their results with those of an earlier survey they think that the incidence of parasites has fallen especially of *Ascaris* and *Trichuris*. Hookworm infection is common.

TUPAS and MAGALAC MONALES (p. 627) report several cases of intestinal obstruction due to infection with *Ascaris*. BRENNER with his colleagues (p. 1100) found *Ascaris lumbricoides* in the ileopancreatic patient. DAVIES *et al.* (p. 457) have demonstrated the antigenic properties of *Ascaris lumbricoides* by repeated injections of a crude extract of that worm.

LAZAROVA and B. STARR (p. 451) have used hexylresorcinol in a rural campaign against helminthiasis, particularly hookworm and *Trichuris*. Dr. MURDO *et al.* (p. 431) have used hexylresorcinol in the treatment of infection with considerable success but they note that in few cases were the cystoids were crushed they produced first-degree burns to the intestinal mucosa. LAR *et al.* (p. 351) used decoction of seaweed *Enteromorpha* in the Philippines when the infestation was severe.

For details the original should be consulted.

From Panama BROSIUS *et al* (p 1023) report a case in which ova of *Capillaria hepatica* were found in the faeces

TOUMANOFF and LE-VAN-PHUNG (p 354) report a case of infection with *Gnathostoma spinigerum* acquired either in Indo-China or Thailand They describe the symptoms Another case from Indo-China is described by TOUMANOFF and NGUYEN VAN HUONG (p 355)

Filarial infections

PINTO and DE ALMEIDA (p 1101) found microfilariae of *Wuchereria bancrofti* in about one-half of the people examined in Portuguese Guinea *Anopheles gambiae* appeared to be the chief vector *Acanthocheilonema perstans* was found in 3 per cent of those examined DILLER (p 101) found *W bancrofti* in Liberia, where there is evidence that *Anopheles gambiae* is the vector *Acanthocheilonema perstans* was found there also

GALLIARD (p 264) has observed complete development of *W bancrofti* in *Aedes aegypti*, and of *W malayi* in *Aedes aegypti* and *Aedes albopictus*, early larval stages of *W bancrofti* were found in *Aedes albopictus* MARKS (p 370) notes that *Aedes kochi* is an efficient vector of *W bancrofti* in Queensland, but that there is confusion as to its recognition She has published descriptions of this and related species

MURRAY (p 807) in American Samoa found microfilariae in the blood in about 5 per cent of children and 50 per cent of old people Elephantiasis was not observed below the age of 30 In those with elephantiasis (about 4 per cent of people over 30) there was a rather higher rate of microfilariae in the blood than in the non-elephantoid population FRANKS *et al* (p 453) report on *W bancrofti* infection in Okinawa, where (they think) all persons except very young infants are infected They used an antigen prepared from microfilariae of *Dirofilaria immitis*, for skin tests, and found that it had a limited value It does not give many false positive results, but it is often negative in persons with circulating microfilariae, or with elephantiasis

CHEN (p 1022) reports on filariasis in Fukien Province, China, where microfilarial incidence varies from nil to 30 per cent Microfilariae of *W malayi* were found in one-fifth to one-third of the positive cases HU (p 1022) has found that *Culex pipiens* var *fallens* is a poor vector of *W malayi*

Survey work carried out by BUTTS (p 352) indicates that Limon on the Atlantic coast is the original endemic area of *W bancrofti* infection in Costa Rica, *Culex quinquefasciatus* [*fatigans*] is the probable vector GIGLIOLI (p 628) has shown that *Anopheles darlingi* is a good vector of *W bancrofti* in British Guiana

Clayton LANE (p 802), before he died, set down in detail his argument on filarial periodicity His theory was that female *W bancrofti* each day give birth to large numbers of embryos, which appear in the night blood, and that each day these embryos are destroyed by the reticulo-endothelial cells of the host He supported his argument by reference to a large number of slides of histological material left by the late Professor O'Connor The argument is complicated and the reasoning is close, and the original, or the original abstract, should be consulted GALLIARD *et al* (p 1101) observed the effect of extirpation of adult *W bancrofti* on the rhythm of periodicity and persistence of microfilariae General anaesthesia has no effect, and destruction of a considerable number of adult female filariae has little effect on the number of microfilariae On the other hand, surgical shock and physiological disturbance are capable of exciting immediate and prolonged dislocation of microfilarial rhythm

WARTMAN (p 1020) has contributed a most important paper on the early manifestations of filariasis seen in men of the United States Services who

served in Samoa and other islands. The usual incubation period was 5-12 months, but adult worms have been found within 3 months of first exposure. The most common signs were lesions of the genitalia and lymphadenitis of inguinal, femoral, axillary and epitrochlear glands. Microfilariae were not often found in the blood, but they or adult worms, were found in 22 per cent. of biopsies. Bacterial cultures of biopsy material were almost always negative. A description of pathological findings is given. Hypersensitivity is probably the explanation of many common symptoms. Intradermal tests were positive in over 80 per cent.

HARTZ and VAN DE STADT (p. 352) describe a case of microfilarial granuloma of the female breast.

ZELIGS (p. 189) shows that the intradermal test for filariasis in which a saline extract of *Dirofilaria immitis* was used as antigen, could not be relied upon for the diagnosis of *W. bancrofti* infections, since it was negative in 25 per cent. of suspected cases and positive in 19 per cent. of controls. From experiments on skin tests for filariasis in rabbits WILKINSON *et al.* (p. 808) conclude that cross reactions with intestinal helminths do not ordinarily occur.

OTTO *et al.* (p. 353) who studied blood levels and excretion rates of persons with *W. bancrofti* infections who were given trivalent or pentavalent antimonials by injection, found that the former compounds had much greater affinity than the latter for red cells. The pentavalent compounds were excreted in larger amounts than the trivalent immediately after injection probably because they are not bound to the red cells. Excretion is more rapid at the end than at the beginning of treatment and the plasma concentrations are maintained for only a short time. It is wise therefore to give injections at as short intervals as are compatible with safety. Intervals of 1" or 24 hours are suggested.

CULBERTSON (p. 101) reports work done by himself and his colleagues on the chemotherapy of filariasis. They showed that in *Latomosoides corrusi* infection of the cotton rat, pentavalent antimonials kill the adult worms quite quickly but that the microfilariae persist for months in the blood. In *W. bancrofti* infections of man, neosalvarsan was the most satisfactory of the antimonials but none of these drugs was ideal. In *L. loa* infections there was apparently some benefit but not with *O. cofnasus*. In discussion of this paper HAWKING made the point that the longevity of the microfilariae after treatment renders assessment of results difficult unless observation is prolonged. He had found arsenicals even more active than antimonials. ROBERTS (p. 214) recalls his early results in the treatment of filariasis with tartar emetic noting that in some cases the microfilarial counts fell steadily for 3 months after treatment. In these the adult worms had probably been killed. He refers to the work of Culbertson (above) who showed that microfilariae persist for long periods in the blood.

SANTIAGO-STEVENS *et al.* (p. 355) report that two days after administration of Hetrazan by mouth for 3-71 days, microfilariae of *W. bancrofti* were absent from, or greatly reduced in the night blood of a group of infected patients in Porto Rico. There was evidence which suggested that the drug had a lethal effect on the adult worms. [See HEWITT *et al.* below.]

The pharmacological properties of Hetrazan are described by HARNED *et al.* (p. 628). Its toxicity is low.

LOVETT-CAMPBELL (p. 723) discusses the surgical treatment of large elephantoid scrota. Details should be sought in the original. Surgical treatment of elephantiasis of the legs is dealt with by DR REYES PUGHURE (p. 922) who describes his operation in detail.

PERTRAM (p. 285) describes his experiments to determine the period required by *Latomosoides corrusi* to reach the infective stage in *Lepomis* *baoti* and

the length of time during which the mite is infective. Transmission is associated with feeding, but the exact mode is not known. Mites are infective within 15 days of the infecting blood meal, and some remain so until the 36th day after the infecting meal. SCOTT (p 808) has devised a method for infecting cotton rats with relatively constant numbers of *Litosomoides carini*. WHARTON (p 103) describes the pathological changes in *L. carini* infections of the cotton rat. The reactions seem to be due primarily to the excretions of the living worms, and not necessarily to disintegration of dead worms.

HEWITT *et al* (p 454) have tested a large number of organic non-metallic compounds in dogs infected with *D. immitis* or cotton rats infected with *Litosomoides carini*. They describe the techniques and the criteria of effectiveness adopted. The best balance between activity and toxicity was found in the piperazines, administered orally or intraperitoneally. The same group of workers (p 455 *bis*) report in detail on the piperazine compound 84-L (Hetrazan), which acts directly on microfilariae, producing a rapid and great reduction in their numbers, and also, but less certainly, on the adult worms. It may be given to animals by mouth or peritoneum, and in the doses used it did not display severe toxicity.

Onchocerciasis occurs in the Bahr-el-Ghazal Province of the Sudan, and KIRK (p 531) found positive skin smears in 19-90 per cent of people examined in various places, with nodules in up to 46 per cent and blindness in up to 10 per cent. Hydrocele and scrotal elephantiasis were very common, but infection with *W. bancrofti* was very rare. MAZZOTTI (p 922) notes that onchocerciasis is prevalent in Mexico, where the vectors are *Simulium ochraceum*, *S. callidum* and *S. metallicum*. He notes that allergic attacks may occur, with fever and local induration of the skin. In treatment he uses Hetrazan in doses of 2 mgm per kilo body weight, thrice daily for 3 weeks or more. MAZZOTTI and HEWITT (p 532) treated with Hetrazan a few patients suffering from onchocerciasis. There was apparently some reduction in microfilariae in the skin, but some nodules extirpated later still contained living adults and microfilariae. NOBLE (p 354) has examined the tissues of the eye in onchocerciasis, and concludes that microfilariae may be found in all the tissues, but have a predilection for the conjunctiva.

VAN HOOFF *et al* (p 456) report very favourably on Belganyl (Antrypol, Bayer 205) in the treatment of onchocerciasis. A dose of 1 gramme each week to a total of 7 grammes is usually enough for cure, a total of 10 grammes appeared always to be successful. RUIZ REYES (p 265), however, has tried Naphuride sodium (which is the same as Bayer 205) in onchocerciasis, but without recognizable benefit.

Various filarial infections (*W. bancrofti*, *O. volvulus*, *L. loa* and *A. perstans*) are present in SW Sudan. WOODMAN (p 627) thinks that although *L. loa* can develop in *Chrysops distinctipennis* and *C. longicornis*, the process is so slow, and the flies are so rarely attracted to man, that some other vector probably exists.

FAIN (p 100) has carried out a survey of human filariasis in the Banningville territory, Belgian Congo. A focus of *W. bancrofti* infection was found, and several foci of *O. volvulus*. More interest attaches to *Dipetalonema streptocerca* which predominates in the south, but is also found along the Wamba and Kwango rivers. The cause of its distribution is not understood, it does not produce clinical symptoms. *A. perstans* is found throughout, especially in riverside villages, *L. loa* is rare. PEEL and CHARDOME (p 809) have found *Dipetalonema streptocerca* (*Agamofilaria streptocerca*) in chimpanzees in the Belgian Congo, and describe the adult worms. They also describe the adult *O. rodhami* from chimpanzees.

DEJON (p. 1103) shows that cysts containing dead or disintegrated *Dracunculus* may resemble cold abscesses and may be found in patients who have never expelled a worm. He describes 3 cases, in 2 of which the cyst was on the forearm.

Enterobius Trichinella

GAYTON *et al* (p. 809) found *Enterobius* infection in 37.6 per cent. of 157 children examined in South Vancouver. All types of families were involved. More than one-third of a series of children examined in Honolulu were infested by *E. vermicularis* (ALICATA and KARTMAN, p. 833) and AMATEX (p. 829) found 47 children in São Paulo positive for the same worm.

DESCHIEUX and LAMY (p. 629) discuss the merits of the various drugs used for *Enterobius* infection. For healthy adult patients they prefer purified phenothiazine but for children and anaemic adults they prefer subnitrate of bismuth. They discuss the action of gentian violet and other dyes which are less toxic than phenothiazine. BLOOM *et al* (p. 201) have treated 123 children with phenothiazine in *Enterobius* infestation and report good results.

ERNARDY (p. 1023) discusses the drugs which have been used in the treatment of *Enterobius* infection. He concludes that none is reliable.

The incidence of *Trichinella spiralis* in diaphragms taken at autopsy in England was 10.8 per cent. (LOUNG, p. 355). There was evidence that infection had taken place both recently and a considerable time ago. The fact that cysts of obviously different ages were found in a single cadaver indicated that one infection did not confer immunity.

An outbreak of trichinosis in a camp of German prisoners of war in the United States was traced to canned bacon and pork, which had been eaten raw. DAVIS and CLELAND (p. 399) report that most of the patients suffered from mild diarrhoea and a condition rather like influenza but with more muscular pain. Eosinophilia was common and some patients had sub-conjunctival haemorrhage.

STARKER (p. 457) found adult *Trichinella* in male and female sections of the large and small intestine of a man who died 54 days after eating raw pork. Such a finding is rare. Larvae were extremely numerous in the diaphragm, and were also present in the heart (causing myocarditis) and testis. It is important to attempt to remove adults from the intestine but anthelmintics are of little use; the author advocates purgation and perhaps administration of convalescent serum.

In an outbreak of trichinosis at a military school in Chile VIGNER *et al* (p. 350) noted that though symptoms on the whole were typical but mild, some patients showed a rash which was at first thought to be that of typhus. SKINNER (p. 630) describes two patients with trichinosis in whom there were severe mental and neurological changes during the acute stage of the illness. Both patients recovered from the mental changes but left residual signs persisted (for instance unilateral tensor plantar rigidity).

OLIVER-GONZÁLEZ and HEWITT (p. 870) tried Hetrazan in experimental trichinosis giving the first dose 24 hours after infection. The results (on rats) indicated considerable effect in reducing adult worms and larvae in the treated animals, compared with controls. (For details see p. 870.)

MALARIA

ECKSTEIN, Albert Malaria in Kindesalter

This book is reviewed on p 881

APARICIO GARRIDO J Estudio parasitológico del genero "Plasmodium"
[Parasitological Study of the Genus *Plasmodium*] *Med Colonial* Madrid
1949, June 1, v 13, No 6, 465-95, 2 pls [Numerous refs]

A general review

SPANEDDA, A & FLORIS, M Sulle forme E E del parassita malarico nell'uomo
[On the E E Forms of the Malarial Parasites of Man] Reprinted from
Riv di Malarologia 1945, Sept-Dec, v 24, Nos 9/12, 16 pp, 13
coloured figs on 1 pl [13 refs] English summary (4 lines) in *Lavori
dell' Istituto d'Igiene d Univ di Cagliari 1940-1946* 1949

A comprehensive summary of the work on exoerythrocytic schizogony is given, beginning with the speculations of GOLGI in 1893, continuing with the work on avian forms and ending in 1945 on the debatable ground of so-called E E forms in human malaria

The authors investigated 85 cases of human malaria in Cagliari by the examination of sternal puncture material There were 53 cases of *P falciparum* malaria (22 primary cases and 31 relapses), 31 of *P vivax* (10 primary and 21 relapses) and 1 relapsing case of *P malariae* So-called E E forms were observed in 6 of the *P falciparum* and 5 of the *P vivax* cases, both in primary attacks and in relapses, and in febrile and afebrile cases A coloured plate illustrates the findings The *falciparum* forms are extracellular bodies, round or oval, slightly larger than an erythrocyte and contain up to 8 masses of chromatin, but no pigment The cytoplasm is strongly basophilic The *vivax* forms are of similar type but much smaller, with a maximum of 5 masses of chromatin The authors obviously studied their results critically, they examined the bone marrow of 25 patients with no malaria, with negative findings, and concluded that these bodies were not broken-off fragments of cytoplasm of marrow cells but, on the contrary, might be referred to the exo-erythrocytic stage of malaria parasites

[This is one of the papers which ANGELINI (this *Bulletin*, 1948, v 45, 24) criticizes on the grounds of insufficient morphological evidence]

P C C Garnham

MUDROW-REICHENOW, Lilly Unser heutiges Wissen von der Plasmodien-
entwicklung im Wirbeltier [Our Present Knowledge regarding the Develop-
ment of *Plasmodium* in the Vertebrate] *Ztschr f Tropenmed u Parasit*
Stuttgart [1949], v 1, No 1, 113-52, 2 figs [Numerous refs]

Since the discovery of the exoerythrocytic development of *Plasmodium* there have appeared numerous reviews of the contemporary state of our knowledge of the life-cycles of the malaria parasites in the vertebrate host The present paper is one of the most recent and extensive reviews of this subject It includes works published in Germany during the war years and subsequently chiefly by the author herself, by Kikuth and by Reichenow, working singly and in collaboration

These observers have made a number of important contributions to our knowledge of the exoerythrocytic development of the avian malaria parasites, for

which they have not always received the credit they deserve. It is difficult to review adequately a paper which is itself a review. Those interested in the subject should consult the original. The following will give some idea of the questions dealt with and of the author's own views.

The first section of the paper is devoted to the exoerythrocytic (EE) forms of the avian and reptilian parasites. A general account is given of their development in various species of *Plasmodium*. It is noted that the special positive of *P. douglasii* which develops in cells of the haemopoietic system is more apparent than real for it would seem that in infections following the inoculation of sporozoites this parasite behaves like the other avian species, in that it develops in reticulo-endothelial cells. The initial stages of development of the sporozoite were described independently by RICHMOND & MURKOW (1943, [this Bulletin 1944 v 41 180]) in *P. relictum* and by HOFF and COETSKOV (1944) (*ibid.* 1945 v 42, 538) in *P. gallinaceum*. The German and American authors also showed that there were two types of exoerythrocytic schizogony: one giving rise to macromeronts which continued the EE cycle, the other giving rise to macromeronts which invaded the erythrocytes where they continued to multiply asexually or became gametocytes. In this respect the avian species of *Plasmodium* differ from the human ones and show a closer similarity to *Haemoproteus*. EE development in the chronic phase of the infection occurs in *P. gallinaceum* and *P. cathemerium* but has not been demonstrated for *P. relictum*.

The author next discusses the relation of EE stages to the blood forms and notes that while sporozoites introduced into the host invariably develop in reticulo-endothelial cells, the inoculation of blood forms gives rise both to EE forms and to erythrocytic stages. The latter are therefore capable of reverting to the former. As regards the bearing of EE development to immunity, some observers have shown that immunity acquired in the course of an infection protects against superinfection and reinfection with both EE and blood forms, while others found that it did not protect against infection with sporozoites of the same strain of parasite. The author believes that in the latter case development does not proceed beyond the earliest EE stages.

The author then turns to the host-cells of avian EE forms which are primarily phagocytic cells situated in different organs and tissues. Cultures of EE forms in bird embryos and tissues are then dealt with. The culturability of these forms in chicken-tissue apparently depends on the viability of the host's macrophages; therefore it is to be expected that those species of *Plasmodium* which invade these cells will readily grow in tissue-cultures.

The second section of this paper is devoted to the Haemosporidia of mammals. Attention is drawn to the special position of the parasites of bat and of *Hepatoscys* of monkeys in which only gametocytes are found in the blood. The bat parasites seem to have affinities with *H. emmonsi*, while *H. jayakari* is more closely related to *Leucocytozoon*. A detailed account is given of the discovery of the EE development in *P. cynomolgi*. The author credits mainly to the previous discovery by GARNHAM of the asexual stages of *Hepatoscys* which in the liver of infected monkeys thus *Haemosporidia* (1947 v 44 187, 1948 v 45 683). The author supports the view that there is only one pre-erythrocytic generation in *P. cynomolgi* and that it is not able to infect other monkeys with liver material during the incubation period.

Finally an account is given of the development of our knowledge regarding the EE stages in human malaria parasites. Their existence was first inferred from circumstantial evidence, this led to prolonged searches by numerous investigators culminating in the discovery of EE stages of *P. falciparum* in human liver by SHOOTER, GARNHAM & VILL & WHITE in 1948 v 45 487.

Although the existence in human malaria parasites of an EE development has now been established beyond doubt, a number of questions are still unsolved. Thus nothing is yet known regarding the tissue stages of the other three species of *Plasmodium*, the earliest stages of development of the sporozoites in man have not been demonstrated, it has not been definitely settled whether there are one or more pre-erythrocytic generations, and whether merozoites differing in size are produced. The author and REICHENOW (1949) suggested that since the rapid disappearance of the sporozoites from the circulation is presumably due to phagocytosis by endothelial cells, their initial development, before they invade the parenchymatous cells, probably takes place in the reticulo-endothelial elements of the liver.

In conclusion, it is stated that the new findings throw light on the affinities between various species of *Plasmodium* and on their relationship to *Haemoproteus* and *Leucocytozoon*, which proved to be much closer than was previously suspected. However, a revision of the systematics of the Haemosporidia should not be attempted until the life-cycles of more species of *Plasmodium* from vertebrates are thoroughly studied.

There is an extensive bibliography of works published since 1941 the earlier literature is listed in a previous paper (KIKUTH & MUDROW *Erg Hyg*, 1941, v 24, 1) [For a full review of the EE schizogony, see also GARNHAM, this *Bulletin*, 1948, v 45, 831] C A Hoare

BOVENTER, K Ueber das Verhalten der Malaria-parasiten im konservierten Blut [The Behaviour of Malaria Parasites in Preserved Blood] *Ztschr f Tropenmed u Parasit* Stuttgart [1949], v 1, No 1, 91-101 [24 refs]

After noting what others have recorded on the persistence of malaria parasites in blood withdrawn from the body and kept for various lengths of time, the author records his own investigations. The blood was drawn into a solution containing sodium citrate 5 gm, dextrose 40 gm, in a litre of distilled water, the proportion of preservative being 3 : 1 or 10 : 1, it was kept in paraffin-capped tubes in quantities of 8-10 cc, or in larger ampoules holding 250 cc. The subjects were nine patients who had been infected by mosquitoes, 5 with subtertian and 4 benign tertian infections. The blood was kept at 37°C, at 21° and at 4° and was examined at intervals up to 150 days. The morphological changes in the parasites from time to time are noted, their loss of definition, loosening of pigment which may be seen lying free in the corpuscles, change of shape to the semicircular or coronoid form, fragmentation of the chromatin, disappearance of the plasma, etc. These changes take place rapidly, within a day at 37°C, more slowly at 21° and still slower at 4°. The subtertian parasites lived longer than the benign, and even after 100 days the differentiated "resistance" forms of *P. falciparum* were recognizable, and some even at 150 days.

The infectivity was tested by inoculating amounts varying from 6 cc to as much as 90 cc (the former intramuscularly, the latter intravenously), using blood kept from 6 to 150 days. Thirty-two inoculations were made, 18 with *P. vivax*, 14 with *P. falciparum* blood. Five infections resulted, 3 with *P. falciparum*, 2 with *P. vivax*. The longest times of preservation to yield a positive result were 13 days with *P. vivax* and 21 days with *P. falciparum*, 10 cc of the former had been injected and 85 of the latter, both intravenously. ROSE and WOLPERT's record of infection with blood preserved for 90 days the author could not confirm. [The reference for this is given as *Veröffentl aus d Gebiet des Volksges* 17, H 3 (1942)] H Harold Scott

BREINDL, V & KOCHÁREK J. *Anopheles* Czech & Moravia [*Anopheles* of Bohemia and Moravia.] *Časopis C. Zoologické Společnosti v Praze* Prague 1940 v 8 17-85 1 text fig & 5 pls. Summary in Latin.

The following is a translation of the authors' summary —

- 1 Two species of *Anopheles* namely *A. clariger* and *A. maculipennis* are found in Bohemia and Moravia.
- 2 Only two varieties of *A. maculipennis* are found namely *A. maculipennis typicus* and *A. maculipennis messiae*.
- 3 The anophelines are not found free in nature but almost entirely in stables and human dwellings.
- 4 *A. m. messiae* is met with most frequently especially in the neighborhood of fish ponds and the banks of streams.
- 5 *A. m. typicus* is much less frequent and occurs only in the lower hilly country.
- 6 *A. clariger* (*infurcatus*) is found throughout but principally in hilly regions where aestivo-autumnal malaria might be found.
- 7 Among the three species there are neither purely zoophilic nor purely anthropophilic forms.
- 8 *A. m. atroparvus* has not been encountered so far in Bohemia and Moravia.

H J O'D Burke-Gaffney

CEPULCHI P & MINO, A. L. *A. (Anopheles) hyrcanus* var. *pseudofictus* in provincia di Venezia. [*Anopheles* (*M. zerkynus*) *hyrcanus* var. *pseudofictus* in the Province of Venice.] *Riv. di Malariologia* 1949 Apr v 28 No. 1 125-7 2 figs.

The English summary appended to the paper is as follows —

"The presence of *Anopheles* (*Macrosynthesus*) *hyrcanus* var. *pseudofictus* in the territory of Venice is signalled for the first time. A review is made of the Anophelines represented in the same territory.

McINTOSH, J. A New Variety of *A. phlebotomus* from Burma. *Bull. Entom. Res.* 1949 May 40 Pt. 1 49-52, 2 figs.

RACHON R, G. FREIRE, M. O & FERREIRA D. M. D. distribuição vertical das criadouras dos mosquitos do sub-genero *Anopheles* em condições permanentes. The Vertical Distribution of Breeding Places of Anophelines of the Subgenus *Anopheles* under Experimental Conditions. *Rev. de Med. Mal. trop.* Rio de Janeiro, 1949 Jan. v 1 No. 1 31-8 3 figs.

From data collected from the examination of thousands of bromeliads the authors have previously shown that it is the lower plants (less than 100 cm) which are the most important breeding places of the larvae of *Anopheles* in the tropics.

In this paper they describe how it was determined that the vertical distribution of the breeding places of these anophelines is not the same in all the regions. They give the results of the examination of the bromeliads in the different regions and show that the vertical distribution of the breeding places is not the same in all the regions.

OVERMAN, R R, HILL, T S & WONG, Y T Physiological Studies in the Human Malarial Host I Blood, Plasma, "Extracellular" Fluid Volumes and Ionic Balance in Therapeutic *P vivax* and *P falciparum* Infections *J National Malaria Soc* 1949, Mar, v 8, No 1, 14-31, 13 figs [30 refs]

Physiological and biochemical estimations were made in 70 patients suffering from syphilis of the central nervous system, 42 of them were suffering from induced *vivax* and 28 from *falciparum* infections. The infections were about equally mosquito- and blood-induced. More than half those examined were negroes.

Measurements were made of blood plasma and "extracellular" fluid, erythrocyte volumes, whole blood, plasma, erythrocyte and urine concentrations of sodium, potassium and chloride, urinary volumes and urinary excretion of potassium, sodium and chloride, plasma total protein, haematocrit, changes in body weight, temperature, parasitaemia, etc. The methods used are briefly described, sodium and potassium were measured by the flame photometer, plasma volume by the use of the dye T-1824, a multiple sampling technique being used, extracellular fluid volume by the thiocyanate method.

Control figures were obtained before the induction of malaria. After the controls had been obtained the patients were infected. From then on serial determinations were made during the active clinical stage of the malaria, and in convalescence after antimalarial treatment. The results obtained qualitatively corresponded with those observed by the authors in *P knowlesi* infections in monkeys. The changes observed are considered in the text against "the number of days of positive parasitaemia". According to the authors, they might equally have been measured against the number of paroxysms or the number of hours of fever. In the general discussion of results, those obtained in *vivax* and *falciparum* infections are grouped together since there were no qualitative and few quantitative differences observed in these infections. Controls were considered to be syphilitic patients who had not yet been infected with malaria.

The authors found that parasitaemia rises almost linearly up to the last observation before antimalarial treatment, the linear rise representing the number of hours of fever and the number of paroxysms continued beyond the period of introduction of treatment. There is some confusion here as the figures for each point on the text curves are obtained by taking the average values of "20-50 cases" including in some instances cases in which antimalarial treatment had been begun. The authors' arguments are thus sometimes difficult to follow.

Changes observed in blood volume were equivocal. There was progressive reduction in red-cell volume which became more pronounced after the sixth day of the malaria, and which was usually offset by a roughly equivalent increase in plasma volume. There were, however, cases in which there was a profound reduction in volume. These were suddenly fulminating cases few of which responded to treatment. A diagram illustrating the changes in three of these cases is given.

Extra-cellular volume increased progressively during the disease, as in *P knowlesi* infection [see this *Bulletin*, 1948, v 45, 766]. In some cases there was evidence that the cyanate must have entered the tissue cells, because the figure obtained approximated to that of the total body water. This indicated that there was some alteration of permeability of cell membranes, which normally exclude the cyanate.

The authors examined the balance between the tissue fluid and sodium, potassium and chloride of the cells. These ions in whole blood reflected

progress and anaemia. As the haematocrit value fell the sodium rose and potassium decreased. The ionic content of plasma was examined before, during and after paroxysms in rarer infections and the rise of potassium and fall of sodium content during the paroxysm, frequently described by other authors, was confirmed. There was not always any striking *proportional* change in the concentrations of these ions during the disease.

There was however a general linear reduction of the average potassium content and an increase in the sodium content of the non-parasitised erythrocytes. This was not statistically significant probably because the malaria was controlled. It was significant in infections in monkeys which were allowed to run a fatal course. In some of the human cases the changes in sodium and potassium content of the cells were pronounced. A brief account of such cases is given. The authors suggest that there is probably an exchange of sodium for potassium in the uninvaded erythrocytes.

These changes in ionic balance recover apparently only slowly during convalescence. The authors found recovery in some cases took weeks or months and refer to such slow recovery as "cellular convalescence".

There was a reduction in sodium chloride output in the urine which was more obvious in fatal malaria in monkeys. In the human cases, unlike monkeys, the potassium output also fell. The authors suggest that possibly in more severe malaria the reverse would have occurred.

Only total plasma proteins were estimated and these in terms of total protein per kilogramme of body weight. There was no constant loss of body weight and therefore the rise in total circulating protein reflected the increase in plasma volume. The authors suggest that both water and protein must be added to the blood in malaria and the reduction observed in total protein can be explained on the grounds of addition of relatively more water than protein.

On the whole they agree with ELLMAN and MURPHY (J. Clin. Invest. 1945, 24, 780) that anaemia in malaria is due not only to blood destruction but also to dilution of the blood possibly as an intermittent process coincident with the paroxysms.

(This paper is an interesting attempt to cover some of the more obvious gaps in our knowledge of the physiological processes underlying malaria. It contains much useful information but it is pity that more details of individual cases have not been given. The authors have grouped their results together in batches of unknown numbers again according to the period under figure 1 from 20 to 50. The various stages of the malaria have not been sufficiently clearly separated off. For instance in one set of figures the final point seems to include a mixture of both treated and untreated cases. No doubt the authors adopted this method of expression for their results for simplicity's sake but in a disease like malaria which varies so much from person to person this is unfortunate. The studies over the period of convalescence are not included in this paper, they are promised in future papers. The reviewer looks forward to further work of this kind.)

B. C. Macintosh

RILEY, J. A. & ROBINSON, C. M. Leukemoid Reaction due to Mixed Malaria Infection. Report of a Case. *Blood* 1947, Vol. 4, No. 3, 263-7 figs.

There are in the literature references to the presence of immature forms of the granulocyte series during malarial paroxysms but there is no previous reference given to a definite leukemoid reaction in malaria. See this Bulletin 1928, 24, 141.

The case presented was that of a negro resident in the Philippines about a month after leaving that country for a limited hospital in the U.S.A.

with a sharp febrile attack clinically diagnosed as malaria. The diagnosis was not, however, confirmed for about a month and he was not given specific treatment until parasites of *Plasmodium vivax* and *Plasmodium falciparum* had been found in the peripheral blood (A figure shows *P falciparum* gametocytes and *P vivax* trophozoites only)

On admission, his blood picture was 1.16 million red cells per cmm, 4.0 grammes haemoglobin per 100 cc, and 4,000 leucocytes per cmm (band forms 14 per cent, metamyelocytes 21 per cent and myelocytes 11 per cent). With blood transfusions, the red cell count improved and subsequently, even during the severe febrile attacks of untreated malaria during the next month, there was no return of metamyelocytes or myelocytes to the blood, but band forms varied up to 30 per cent.

On the 6th day after admission, when the temperature was almost normal, a sternal marrow smear showed a marked increase in the early forms of the neutrophil series but few "blast" forms—a tentative diagnosis of myeloid leukaemia was, however, made on the smear. When the malaria parasites were eventually found in the blood, the patient was given a full course of atabrin [mepacrine] and apparently cured. A second sternal marrow smear 12 weeks after the first showed a normal picture.

L. E. Napier

BLACKBURN, C. R. B. Observations on the Development of Resistance to *Vivax* Malaria. *Trans Roy Soc Trop Med & Hyg* 1948, Sept, v 42, No 2, 117-62, 15 charts [23 refs]

This is a report of work carried out in the Medical Research Unit, Cairns, during and immediately after the war. It deals with the development of tolerance and immunity in healthy volunteers who were experimentally infected with *P vivax*, and who had not previously been exposed to malaria.

In his introduction the author points out that resistance to *vivax* malaria may be manifested in one or both of two ways—

"1 There may be less reaction by the host to a given bulk of infection—tolerance

"2 There may be an increased ability of the host to limit the bulk of infection developed—immunity"

The paper is divided into three parts. Part one deals with experiments designed to illustrate the development of tolerance and immunity after mosquito-transmitted malaria. Part two deals with experiments designed to show that the development of tolerance precedes that of immunity, and that immunity is strain-specific. Part three refers to experiments illustrating the development of tolerance after the use of various chemotherapeutic agents.

The paper is very long and detailed, and it would be impossible to deal with it fully in a short review. The interested reader is referred to the original. The author's conclusions may be given in full.

"1 Tolerance to the effects of *vivax* malaria developed before an enhanced ability to deal with the invading parasite

"2 Tolerance and immunity developed in response to *P vivax* trophozoite activity rather than to activity of exo-erythrocytic forms, the degree of tolerance and immunity depended on the bulk of the trophozoite experience of the individual.

"3 Volunteers who had become tolerant to one strain of *P vivax* showed definite tolerance to trophozoites of another strain of *P vivax* on their first experience of the second strain. Tolerance to *P vivax* is not necessarily strain-specific

"4 Subjects who had become immune to one strain of *P vivax* did not exhibit any enhancement of their anti-parasitic mechanism when infected

with trophozoites of another strain. Anti-parasitic immunity may be strain-specific.

"5. Subject who had developed complete tolerance and solid immunity to their trophozoites were perfectly fit, had impalpable spleens and had normal or super normal haemo-globin concentrations though trophozoites could be found in their circulating blood whenever adequate examinations were made. Attempts to induce malaria attacks by severe chilling and alcoholic excess were unsuccessful.

"6. Gametocytes were never seen in the peripheral blood of subjects who had developed complete tolerance and immunity to their infection. No tumors were not infected by the blood of these immune subjects.

[Some of the diagrams are difficult to follow. They have been repeated in a smaller form that it is often impossible to read the details. There is some slight confusion in the text with regard to charts 14 and 15.]

B. G. MATTHEW

BOYD M. F. & COLLIER H. D. A Note on the Apparent Antagonism of a Bacterial Intoxication to a Plasmodial Infection. *Amer J Trop Med*, 1949 Mar. v. 29 No. 2, 193-202.

A male negro with a diagnosis of meningo-encephalitis syphilis was inoculated by mosquito with *P. falciparum* (Costa strain) on 25th June 1946. Parasites were first observed on 6th July and on the following day the temperature first exceeded 100° Fahrenheit. Remittent fever continued until the 11th during this period the parasite count slowly increased to reach 7,870 per cmm. on the 11th, which the authors consider a low density for infection with this parasite. A single dose of quinine three grains was given on the 9th. The temperature rose to 100°F on the 14th and quinine three grains was repeated. From then on the parasite density rapidly declined to 10 per cmm. on the 18th. The temperature however persisted and ten grains of quinine were given on the 18th and two more doses of ten grains were given on the 19th. The blood smear on the following day was negative and parasites were never subsequently observed. On the 19th a crepant cellulitis in the perineal region was discovered. The patient was treated with penicillin and tetanus gas gangrene antitoxin and the necrotic tissues were drained. *Clostridium welchii* was grown from the exudate of the lesions. The patient eventually recovered and was watched until 31st July 1947.

The authors point out that the malaria infection in this case was typical because the parasites did not attain a density proportionate to the level of temperatures experienced. The plasmodial therapy administered would not have been sufficient to abort the malaria infection had they been that the *C. welchii* infection which was probably of known origin. The discovery may lead to a soluble extract which would kill the malaria parasites.

F. C. MATTHEW

KREYER R. L. in collaboration with J. A. WILSON & C. L. HARRIS. Chloroquine Manufacture. A Staff Industry Collaborative Report. *J. S. I. & E. in Chem*, 1949 Apr. 41 No. 4 654-6. 5 Lys. 22 ref.

When America entered the recent war she possessed small stocks of quinine and atabrine mepacrine. The need for supplies of these materials was keen and the search for new compounds was co-ordinated by the Office of Scientific Research and Development whose organization has been described by WYSTOLES in "A Survey of Antimalarial Drugs 1941-45" (this Bulletin 1947 v. 44 1107). During the period 1941-45 least 14 C₁₀ and C₁₂ alkaloids were

synthetic chemicals and natural products, were screened. One substance submitted for test by the Winthrop Chemical Company was 3-methyl-4-(4-diethylamino-1-methylbutylamino)-7-chloroquinoline (German Sontochin). Tablets found on German prisoners in Tunisia were identified in America as the same substance, which was now designated SN-6911. Work on this group of substances was intensified in the U.S.A. and a related substance, minus the methyl group in position 3 in the quinoline nucleus, was named chloroquine, now Aralen (German Resochin) and was assigned the number SN-7618. Both Sontochin and Resochin had already been synthesized and tested for antimalarial properties in Germany before the War. The former was considered the more active by the Germans but the Americans found otherwise. A number of reports on the properties of chloroquine (Aralen) have been given by the latter authors [this *Bulletin*, 1946, v 43, 708, 1948, v 45, 955, 960]. When it became necessary to produce the drug on a large scale, indications of a method of synthesis were available in the U.S. patent literature but details were absent. American chemists evolved new methods of synthesis and one of them is fully described in the present article, along with details of production costs. In this particular plant, the manufacture of 5,000 lb of Aralen diphosphate per month was attained and improvements are constantly being introduced.

J D Fulton

VAN DER WALLE, N. Behandeling van malaria aan de kust van Peru met araken [The Treatment of Malaria with Aralen (Chloroquine) on the Peruvian Coast] *Nederl Tijdschr v Geneesk* 1949, May 21, v 93 (ii), No 21, 1698-703

After describing the American work on chloroquine, a detailed description is given of an investigation by Torres Portugal in two Peruvian sugar plantations. On each plantation about 400 persons were selected and the blood examined for parasites. In one case 20.5 per cent of those examined were infected, in the other 30.5 per cent. There were 128 cases, of which 80 had benign tertian, 39 subtertian and 7 quartan malaria. Two patients had a combined infection (*P. vivax*+*P. falciparum*).

Of these, 37 patients were treated with another preparation, SN 8173.5 (7-Cl-4 [3-diethylamine-2-hydroxypropylamine] quinalnebisphosphate), this was found to have unpleasant side-effects and was abandoned. The others were treated with chloroquine, adults having 4 tablets of 250 mgm chloroquine, children of 1-12, 0.5 gm and children under one year 0.25 gm. All were treated as out-patients and seen daily. The blood was examined every day until it was negative. If parasites were still numerous the day after treatment was begun a further dose of 500 or 250 mgm was given and this was repeated if necessary on the third day. After this every patient had a single weekly suppressive dose of 250 mgm.

Young forms of all three types of plasmodia had always disappeared in 24 hours, adult schizonts in 48 hours and the gametocytes of *P. vivax* and *P. malariae* within 72 hours. The sexual forms of *P. falciparum* did not disappear for 6-10 days.

There was no doubt as to the beneficial effect on clinical symptoms. In every case the temperature was normal in 24 hours and after 48 hours the patients felt well. In 14 cases (mainly women) there were toxic manifestations including abdominal pain, headache, lassitude, dimness of vision, vomiting, giddiness and sleeplessness. None caused any anxiety.

In six cases of benign tertian malaria, suppressive therapy was deliberately omitted after parasites had disappeared from the blood. Relapses occurred after 31-51 days.

A L Winner

BAMI, H. L. & GUNJA, P. C. Studies in Antimalarials. Part IX. N-Aryl-N'-alkyl-bisguanides. *J India Inst. Sci.* 1949 v 31A, Pt. 1 1-7

BAMI, H. L. & GUNJA, P. C. Studies in Antimalarials. Part X. N-Aryl-N'-heterocyclic-bisguanides. *J India Inst. Sci.* 1949 v 31A, Pt. 2, 9-14

DOUGLAS B. & KERONACK, W. O. Attempts to find New Antimalarials. Part XXVIII. *p*-Phenanthroline Derivatives substituted in the 4-Position. *J Chem. Soc.* 1949 Apr 1017-22.

STADO, H. E. The Determination of Proguanil. *J Pharm. & Pharmacol.* 1949 June v 1 No. 6, 391-4

JELLINEK D. B. Proguanil Prophylaxis and Intercurrent Infection. *Lancet.* 1949 June 18 1052-3

Previous correspondents in Nigeria referred to a case where 0.1 gm. of proguanil daily failed to prevent a break through of *falciparum* malaria [see DAVEY & SMITH this *Bulletin* 1949 v 46, 706]. The present author also in Nigeria, discusses the prophylactic dosage of proguanil and quotes three cases in Europeans to show that 100 mgm. daily may be insufficient in the presence of intercurrent infection.

The first patient, who had been taking this dose daily in the Sudan for four months developed subtertian malaria with a positive blood film, during an attack of multiple boils. The second, also in the Sudan, had been taking the same daily dose for two months. She developed proved amoebic dysentery which cleared up with emetine treatment but at the end of th treatment she developed an attack of *P. falciparum* malaria. The third patient in Nigeria, had been taking 100 mgm. proguanil for 5 months. He had lamitude joint pains and occasional rises of temperature. Physical signs and blood films were negative but the dose of proguanil was increased to 200 mgm. t.d.s. Five days later bile pigment was found in the urine and a few days afterward he developed hepatitis. This was probably a virus hepatitis, as his wife had had a similar non icteric illness three weeks before. He improved rapidly on appropriate dietetic treatment. About two weeks later he suddenly developed a temperature of 101 F and a heavy blood infection with *P. falciparum* rings.

All these bouts of malaria were mild and short-lived and responded rapidly to therapeutic courses of proguanil usually 200 mgm. t.d.s. for 10 days.

There seems to be no doubt that all the patients had been taking their proguanil without missing a single day.

The author suggests that until the metabolism of proguanil is better known the prophylactic dosage should be increased if the patient has an intercurrent disease however slight. He recommends that at least 200 mgm. should be given daily for malaria prophylaxis both during and in the convalescence following any intercurrent infection.

H. J. O'D. Burke & J. J. J. J.

BEATRÁN E. & VIERO C. V. X. Ensayo del valor de la palodrina en el tratamiento supresivo del paludismo en Boca del Río, Ver. [The Value of Palodrine in suppressing Malaria in Boca del Río, Vera, Mexico.] *Rev Inst. Salubridad y Enfermedades Trop.* Mexico. 1949 June v 9 No. 2, 123-32. English summary

This study of the suppressive action of palodrine against Mexican strains of malaria was carried out on 140 conscripts in a Naval Battalion in Boca del Río, where malaria is endemic. The men were all 18 years of age. They were divided into four groups each of 35 men. Men of Group A were given 0.10 gm.

paludrine once a week, of Group B, 0.30 gm paludrine once a week, of Group C, 0.10 gm paludrine twice a week. Group D were controls receiving no paludrine. The experiment lasted 30 weeks from October to May, 1948. The men were kept under medical observation and blood smears were examined weekly.

There was no clinical malaria among the men receiving paludrine. *P. falciparum* was found in the blood of one man in Group A during each of the first four weeks of observation but not afterwards. Another man of Group A had a single positive *P. vivax* smear in the tenth week.

One man of Group B exhibited *P. falciparum* parasites from the fourth to the eighth week.

No positive blood smears were obtained from Group C.

Parasites were found in 8 men of the control group in which there were 6 cases of clinical malaria, one *P. falciparum* and 5 *P. vivax*.

During the spring recrudescence of malaria no man receiving paludrine had a parasitaemia.

Two weekly doses, each of 0.10 gm, gave the best results. *Norman White*

SHELLEY, H. & AZIZ, M. Anopheles Eradication in Cyprus. *Brit Med J* 1949, Apr 30, 767-8

A brief history of malaria in Cyprus is given. *Plasmodium falciparum*, *P. vivax* and *P. malariae* infections have been recorded from the island. The vectors against which the present eradication scheme was directed were *Anopheles superpictus*, *A. elutus* [sacharovii] and *A. bifurcatus* [claviger].

An anti-larval campaign was begun in April, 1946, and anti-adult measures against hibernating adult anopheline mosquitoes were instituted from the winter of 1946-7 onwards, effective eradication of these vector species from the island has apparently been obtained. No anopheline adults nor larvae have been found in the thirteen weeks preceding the preparation of the present report. It is thought that, apart from maintenance measures, the campaign can be terminated during the summer of 1949.

In 1944 7,686 cases of malaria were reported in Cyprus but this figure had dropped to 406 in 1948 and of these only three were considered to be of recent origin. In school children splenomegaly and parasitaemia dropped from 32.4 per cent and 51.9 per cent respectively in 1944 to 10.6 per cent and 1.3 per cent respectively in 1948. In 1948, 655 infants (under 2 years of age) in formerly highly malarious villages were found to be negative for parasites.

Occasionally "Malarial", Paris Green, and fuel oil were used in the anti-larval work, but the greater part of the larval control was achieved by the use of 3-4 per cent DDT in gas oil. Winter control of adult mosquitoes was effected by "light treatment with DDT" of resting places. Later, in 1948-9, DDT and "Gammexane" smokes were employed against adults in buildings with high ceilings and for other inaccessible places. Considerable efforts were made to trace and to treat adult resting places in caves, tombs, tree trunks, etc., and to deal with all breeding or resting places besides those in or adjacent to centres of habitation. Indeed, every effort was made to destroy the adults and the larvae of anophelines in every part of the island. A brief account of the organization involved is given. The island was divided into six districts and these were subdivided into 39 sections, 111 zones and 556 blocks. A block comprised an area which could be covered by one man in a period of twelve working days.

Observations on the effectiveness of the control measures were made not only by the staff responsible for the work but also by independent observers.

The estimated cost for the campaign was given as £310,000. [See also this *Bulletin*, 1949, v 46, 16.]

D S Bertram

FIELD J. W. & EDISON J. F. R. A Note on Presumed *Exo-Erythrocytic* Development of *Plasmodium russali* in the Liver of the Malayan Squirrel. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949 May v. 42, No. 6 543-72. 8 figs. on pl.

A pigmented parasite of the red blood cells of Malayan squirrels was studied. The organism was thought to be probably the same as that described by various authors as *Plasmodium russali* from squirrels in Indo-China, India and Malaya. Seventy-nine squirrels belonging to four species of *Callosciurus* and one species of *Lariscus* were examined and 68 were found to harbour the infection, some very heavily. Gametocytes only were observed in the blood stream. The surface of the liver in many of the infected animals was studded with cysts; smears from which showed innumerable merozoites. Schizogony was not observed in the brain, lung, spleen, bone-marrow and kidney, nor in the peripheral blood. The liver cysts measured up to 840 μ in diameter and closely resembled the merocytes of *Hepatozoon leuck* (this Bulletin 1948 v. 45 680) a parasite of African monkeys. The cyst was a smooth, round, translucent body with an outer wall of compressed liver parenchyma, sometimes containing giant and other inflammatory cells and surrounding a rim, 50 μ wide, tightly packed with merozoites. The interior of the cyst contained amorphous material. Smears made from a cyst showed an immense number of merozoite-like structures, mostly single but sometimes multiple together with extracellular dividing forms with two to six or more segments of chromatin.

[The authors conclude the paper by asking various questions regarding the systematic position of this parasite of the squirrel. Although its early asexual stages remain undescribed, it would appear to the reviewer justifiable to call it *Hepatozoon russali* and to regard the cyst-like liver structures as the mature asexual forms of the parasite.]

P. C. C. GARNHAM

PARAENSE, W. L. The Latency in *Lophura* Malaria of the Chicken. *Worm. J. d'Osvaldo Cruz.* 1949, Mar v. 48 No. 1 81-7. 7 graphs. [Portuguese version 73-81.]

P. lophurae malaria is primarily a disease of the fire-back pheasant. In the duck it causes a virulent infection; in the domestic fowl the disease is usually said to run a mild and self-sterilizing course. The Rockefeller strain was maintained in Brazil by intravenous inoculations of infective blood into chicks 5-20 days old. The infection reached a peak of parasitaemia about 3 per cent by the eighth day and subsequently declined rapidly. Subinoculations of 0.25-0.5 cc. of blood were performed up to 330 days after inoculation and all the birds developed low-grade infections. Quinine treatment of the initial attack scarcely affected the eventual survival of parasites; 4 out of 5 birds passing into the latent stage which lasted for at least as long as 136 days after the original quinine treatment.

The well-known phenomenon of increase in virulence after repeated transfers was again observed in *P. l.* larvae in chicks; the parasitaemia eventually reached over 10 per cent, and proving fatal.

P. C. C. GARNHAM

McGEE, R. B. The Course of Infection of *Plasmodium gallinaceum* in Duck Embryos. *J. Infect. Dis.* 1949 Jan-Feb 84 No. 1 104-104. 2 figs. [10 refs.]

Adult ducks are only lightly susceptible to infection with *Plasmodium gallinaceum*. Tests were made to observe the behaviour of the parasite in duck embryos. Blood containing a known number of parasites was inoculated intravenously into duck embryos of various ages. All attempts to transmit

a blood infection by inoculation into the chorio-allantois were unsuccessful) The younger the embryo, the more severe was the resultant infection, though all became infected in the end 14-day-old embryos were all killed by the disease, 20-day-old embryos nearly all died, at 26 days, all the infections progressed to a crisis, with development of acquired immunity and recovery, while 2-day-old ducklings responded with only transient low-grade infections Sporozoite infections were initiated by the intravenous inoculation of infected salivary glands from *Aedes aegypti*, ground in a mixture of chicken serum and saline Such infections were studied in 14- and 20-day-old duck embryos They were all accompanied by a heavy tissue parasitism (in liver, spleen, heart and brain) which killed the embryos uniformly, in the blood, in addition to the ordinary pigmented schizonts, unpigmented forms were found free or in basophil erythroblasts, polychromatophil erythroblasts, lymphocytes and neutrophils The author points out that there is a series of adaptations of the parasite, after its liberation from the fixed tissue elements—it first shows a preference for cells of the lower erythrocytic series and for lymphocytes, and later a major alteration in its physiology allows it to develop in the mature erythrocytes where it forms pigment and becomes more susceptible to the immune processes of the host

P C C Garnham

McGHEE, R B Pre-Erythrocytic Development of *Plasmodium gallinaceum* in Avian Embryos *J Infect Dis* 1949, Jan-Feb, v 84, No 1, 105-10, 12 figs on pl [10 refs]

Pre-erythrocytic forms of *Plasmodium gallinaceum* are readily obtained by the inoculation of sporozoites into chick embryos 12 to 16 days old Infected salivary glands of *Aedes aegypti* were implanted on the chorio-allantoic membrane (usually at a vein bifurcation) intramuscularly in wing or leg buds, or elsewhere in the body, and intravenously after grinding The course of development followed closely that described by HUFF and COULSTON [this *Bulletin*, 1945, v 42, 538] in wing skin Only a few sporozoites managed to survive to start the cycle, there was a rapid dispersal from the reaction area, and normal development took place in the macrophages By 24 hours, the chromatin of the cryptozoite divided into two masses and a well-defined vacuole surrounded the parasite as it lay in the cytoplasm of the host cell By 36 hours there were 30 "nuclear structures", at 40 hours, all nuclear differentiation was lost and clefts appeared, followed by separation into oval merozoites with pointed ends arranged radially around a central core The metacryptozoic generation matured about 70 hours after inoculation and resembled the corresponding stages of cryptozoite development Similar stages were seen in the vascular endothelium of the organs the clefts in the cytoplasm of mature schizonts were more noticeable and gave the appearance of cytomere formation In these organs, even as long as 9 days after infection, synchronicity of development was well marked, and this finding was the main point of difference between infections in embryos and in the wing skin of adults where lack of periodicity is apparent even after 70 hours Macro- and micro-merozoites were produced by exo-erythrocytic segmenters in the spleen

P C C Garnham

NADFI E M TAYLOR D Jane GREENBERG, J & JOSEPHSON, E S Adrenal Hypertrophy in Chicks Infected with *Plasmodium gallinaceum* *J National Malaria Soc* 1949, Mar v 8 No 1, 70-79, 5 figs [24 refs]

Changes in the adrenal glands during the course of *Plasmodium gallinaceum* infections in chicks were observed Week-old chicks were inoculated intravenously with blood containing 1,000 parasitized erythrocytes, and the

following observations were made—weight of birds, red blood counts, degree of parasitaemia and the weight of the adrenals taken from chicks at different stages of the infection. Similar observations were carried out on an adequate number of control birds kept under identical conditions. The glands were removed first by a block dissection of an area about 2 cm. square and subsequently under a low power lens the ovoid orange adrenals were isolated from the ovaries, connective tissue etc. A dissection could be completed in 15 minutes.

The results were assessed in relation to body weight and were compared with a similar relationship in normal birds. In the latter the weight of the adrenals is directly proportional to the body weight. Up to a parasitaemia of about 80 per cent., there is scarcely any hypertrophy of the adrenals but beyond that density the glands show a marked increase of weight—on an average they are twice as heavy at the peak of parasitaemia and in one chick, were five times as heavy. With the decline in the blood infection, the glands revert to normal size. The increase in weight was shown to be due not merely to fluid but to an increase in tissue elements. Hypertrophy of the adrenals is known to be caused by starvation but this was proved not to be the explanation of the results in the case of chicken malaria. There are coincidental maxima of anaemia and of adrenal hypertrophy—the authors refrain from ascribing this to cause and effect.

[The authors state that material was taken for histological study, but the results are not recorded in this paper. They might well throw light on the possible aetiological association between malaria and Addison's disease which has been reported on a number of occasions after severe infections with *P. falciparum* in man.]

P. C. C. GARNHAM

BLACKWATER FEVER

RIGDON R. H. Hemoglobinuria (Blackwater Fever) in Monkeys. A Consideration of the Disease in Man. *Amer. J. Path.* 1949 Mar & 23 No. 2, 195-209 7 figs. on 2 pls. [36 refs.]

This report is concerned with the clinical and renal pathological findings in 10 rhesus monkeys (out of 27 infected) which developed haemoglobinuria after intraperitoneal, subcutaneous and intravenous injection of parasitized blood (*P. knowlesi*).

In the kidneys of monkeys in which haemoglobinuria continued to the time of death there were few changes in the glomeruli, but the epithelial cells of the convoluted tubules were always damaged. These cells were sometimes swollen to the point of occluding the lumen, sometimes fragmented or desquamated into the lumen. Small masses of yellowish-brown pigment (occasionally staining faintly with Prussian blue) were present in the cytoplasm and similar masses appeared in the lumina of the tubules. The epithelium of Henle's loop was desquamated, especially in the region of large casts. Casts were present in varying numbers. They were sometimes large homogeneous and pink staining, and sometimes composed of groups of deep eosin-staining granules, approximately equal in size to a red blood corpuscle, sometimes considerably smaller. Other tubules contained amorphous yellowish-brown material. Casts were present in large numbers in the collecting tubules and sometimes in the convoluted tubules. There was no significant change in the interstitial tissue. The small blood vessels were filled with parasitized cells but there

were no specific vascular lesions. In one monkey, which was killed shortly after recovery from haemoglobinuria, the kidneys were normal in size and colour, and no casts were present.

According to the author, younger monkeys with severe infections were especially prone to develop haemoglobinuria, the appearance of which was influenced by the severity of the infection. The CO_2 -combining power was estimated in one animal. It was low, suggesting a severe terminal "acidosis". The presence or absence of either oliguria or anuria was not determined in these experiments, but the author discusses the incidence of these phenomena in monkeys and in blackwater fever in man. He considers that the amount of material within the lumina of the tubules is insufficient "to produce anuria in the manner suggested for cases of the so-called 'lower nephron nephrosis'". Anoxia and shock are probably more important factors. He points out that in severe malaria symptoms of shock may occur and that glomerular filtration, since it is influenced by blood pressure, is probably significantly decreased in the presence of shock. He suggests that such a mechanism is "more significant in producing anuria in blackwater fever than obstruction in the lumina of the tubules".

[The author was one of the earliest to stress the importance of anoxia in the pathogenesis of malarial lesions. His views on the production of anuria are in line with those recently expressed in a considerable volume of literature which is not discussed in this paper. Interested readers are referred to the original.]

B G Macgrath

TRYPANOSOMIASIS

HORNBY, H. E. Electrical Charge of Trypanosomes [Correspondence]
Trans Roy Soc Trop Med & Hyg 1949, May, v 42, No 6, 626-8

This paper deals with experiments designed to test the validity of a method for determining the electric charge of trypanosomes, described by FAIRBAIRN and CULWICK [this *Bulletin*, 1947, v 44, 649]. According to these observers, this can be done in a thin stained blood film, by noting the position of the trypanosomes in relation to the erythrocytes: those in contact with the cells are said to be positively charged, while those not touching the red cells are negatively charged. It is also claimed that the results obtained by this method and by the salt-concentration test [this *Bulletin*, 1937, v 34, 511] are in close agreement.

The author doubts this contention on purely *a priori* grounds. "In view of the very short time required for the making of a thin film, and the relatively terrific mechanical forces to which the blood ingredients are submitted when the blood is spread, it would appear strange that trypanosomes—which are not adherent to red cells in the circulating blood—should within a second or two of release from the circulation, and while submitted to violent mechanical disturbance be able to orientate themselves in any way that is not dictated by this disturbance."

The author then describes experiments, in which he and other observers at Mpapwa carried out parallel tests by both methods with a Tinde strain of *Trypanosoma rhodesiense* maintained in guinea-pigs, which at different periods showed a great predominance (80 to 100 per cent) of trypanosomes carrying a charge of the same sign. Whereas there was complete agreement between these observers regarding the charge on the trypanosomes examined by the

saline-glucose method, their results were completely at variance when the thin film method was used. Thus, in one experiment two observers agreed that 97 per cent. of the trypanosomes tested by the former method were negative's charged, but when they examined the position of the trypanosomes in stained films, one of them reported 93 per cent. and the other 29 per cent. of the trypanosomes as bearing a negative charge.

The author concludes "that the positions of trypanosomes in thin films are governed entirely by the action of the glass spreader—the closer together the elements of the blood, the more likely are the trypanosomes to touch cells; the more widely the red cells are scattered, the more likely is a trypanosome to be detached from all other cellular elements."

[The reviewer is informed of a similar experiment carried out in Britain, in which the observer failed to confirm the results obtained by the glucose-saline test, when he attempted to determine the charge of trypanosomes of the corresponding strains in blood films.]

C. A. HARRIS

FAIRBAIRN H & CULWICK, A. T. The Differentiation of the Polymorphic Trypanosomes. *Ann Trop Med & Parasit* 1949 Apr v 43 No. 1 90-95. [15 refs.]

The authors have made a biometrical study of the polymorphic trypanosomes with the view to detecting morphological differences which would serve as a basis for the differential diagnosis of *Trypanosoma gambiense*, *T. rhodesiense* and *T. brucei*. For this purpose they employed 5 strains of *T. rhodesiense*, 4 of *T. brucei* and one of *T. gambiense*. All the strains, except one were transmitted by *Glossina* and the metacyclic forms were recovered from these flies by induced salivation. Measurements of length were made of both the blood and metacyclic forms of the trypanosomes, in preparations stained by Giemsa's method. The blood forms were obtained from dog, monkey, gazelle and from rats and guinea-pigs inoculated from these hosts and from man and sheep. The results of measurements of several hundred flagellates in each of the normal strains are given in two tables, which can be summarized as follows (Table A) —

TABLE A.

Mean Lengths (i μ) of Polymorphic Trypanosomes (Figure 1 shows represent the mean of means)

	<i>T. rhodesiense</i>	<i>T. gambiense</i>	<i>T. brucei</i>
Blood form			
Short	18.35-19.90 19.25	19.28-21.99 20.30	18.51-21.39 19.31
Intermediate	22.81-1.5 3.51	22.83-1.58 23.49	22.06-1.57 23.71
Long	28.56-30.23 29.43	28.07-30.62 29.06	28.25-30.68 29.1
Metacyclic forms	16.38-18.11 17.24	14.17-15.97 15.24	16.1-18.31 17.42

Among the trypanosomes used in this study there were also two strains of *T. brucei* No. 8 and No. 9 which behaved very differently from the other strains of this species. The measurements of the typical strains on different dates were as follows (Table B) —

TABLE B
Mean Lengths (in μ) of atypical *T. brucei*

	Strain 8	Strain 9
<i>Blood forms</i>		
Short	16 48, 17 18	18 23, 16 81, 14 96
Intermediate	21 12, 23 48	22 77, 23 73, 21 25
Long	28 77, 29 42	26 53, 29 02, 26 00
<i>Metacyclic forms</i>	15 21-16 56 15 68	14 99-16 21 15 69

In discussing the results the authors point out that the polymorphic trypanosomes examined by them fall into two groups. In one (shown here in Table A) represented by 5 strains of *T. rhodesiense*, 2 of *T. brucei* and one of *T. gambiense*, the length frequencies of the various forms tend to normality, while the mean lengths are similar and fluctuate only within small limits. However, the mean length of the metacyclic forms of *T. gambiense* is significantly shorter than that of the other two species, and can serve to differentiate it from the latter.

In the second group (shown here in Table B) are strains 8 and 9 of *T. brucei*, in which the mean length of the blood forms "fluctuates widely, and the length-frequency distribution curves are often abnormal, suggesting a mixture of two or more components." The mean lengths of the metacyclic forms in these strains are also significantly shorter than those of the strains of *T. brucei* adduced in Table A. Further investigations indicated that measurements comparable to those in *T. brucei* strains 8 and 9 were obtained in a mixed experimental infection of rat with *T. rhodesiense* and a "normal" *T. brucei*. The significance of this finding will be discussed by the authors in a future publication.

The authors record other interesting observations on *T. brucei* carried out in the course of this work. In the case of three strains, which were recovered from dog, wild tsetse fly and camel, respectively, the identification of the species was checked by inoculation of human volunteers. The canine strain was tested very thoroughly by allowing heavily infected *Glossina morsitans* to bite 10 men, some of them repeatedly. When none of the men became infected they were inoculated subcutaneously from infected rats, each man receiving from 600 thousand to 42 million trypanosomes. Again not a single infection resulted. The other two strains likewise failed to produce an infection in man. [The first of these tests is perhaps one of the most thorough experimental attempts to infect man with *T. brucei*.]

C. A. Hoare

SPINKS, A. Fluorimetric Determination of "Antrycide" [Correspondence] *Nature* 1949, June 18, 954

A preliminary note

PELLERGRINO, J. O perigo da transmissão da doença de Chagas pela transfusão de sangue. Primeiras comprovações sorológicas de esquizotripanose em doadores e em candidatos a doadores de sangue. [The Danger of transmitting Chagas's Disease by Blood Transfusion. Evidence of the Disease in Blood Donors.] *Brasil-Médico* 1949, Feb 19 & 26, v 63, Nos 8/9, 63

The English summary appended to the paper is as follows —

"It is surprising that the danger of inoculating Chagas' disease through blood-transfusion has not yet been duly considered, and that apparently

nothing is being done in order to prevent it. This danger is a real and serious one for the following reasons. Chagas disease and its natural vectors are widely spread in this continent and in large rural areas this infection is exceedingly frequent. Most doctors are not aware of it. Infection lasts for many years apparently is not susceptible of spontaneous cure and there is no effective treatment for it. While many cases may stay symptomless for a long time a large proportion of infected people show severe heart trouble. *Schizotrypanum cruzi* is easily transmitted through the inoculation of blood into susceptible hosts.

"The writer reports for the first time the occurrence of Chagas disease among people serving as blood-donors in Belo Horizonte Brazil. Three individuals were found which exhibited a strongly positive complement fixation test (*S. cruzi* culture antigen). Formerly they used to live in mud huts with triatomid bugs in the interior of Minas Gerais. Two showed no signs or symptoms of Chagas disease but one showed heart trouble (right bundle-branch block).

"The writer emphasizes the necessity of preventing the dangerous possibility of the spreading of Chagas disease through blood transfusion. It suggests that the complement fixation reaction for *S. cruzi* be necessarily performed in all individuals before they are admitted as blood-donors, in the countries where the disease is known to occur. People exhibiting positive or even doubtful tests should be obviously discarded.

PELLOUX A. & DECOURT P. Toxicité du S.P.N. ou sulphos (thiophosphate o diéthyl o parantrophényl) sur des triatomides vecteurs de la maladie de Chagas. [Toxicity of Thiophosphate o diethyl o parantrophényl (Sulphos) on Triatoma Vectors of Chagas's Disease.] *Bull Soc Path Exot* 1949 v 42 No. 1/2, 22-5.

The authors describe experiments in which S.P.N. was used as a powder and as an emulsion against *Triatoma infestans*. S.P.N. is thiophosphate o diethyl o parantrophényl and is also known as Sulphos.

(1) Groups of five insects were confined in Petri dishes which had been dusted with S.P.N. at concentrations from 1 part S.P.N. in 200 parts of talcum powder to 1 part in 1,000. The powder was distributed evenly giving a deposit of 0.5 mgm. per sq. cm. 100 per cent. mortality was obtained after 48 hours at a concentration of 1 part in 1,000.

(7) Specimens of *T. infestans* were placed in wire mesh cages with wooden floors which had been sprayed with emulsions of S.P.N. in water at concentrations from 1 part in 10,000 to 1 part in 20,000 giving a deposit 1.00 cc. per sq. cm. At a concentration 1 part in 2,000 the symptoms were immediately obvious but the insects remained immobile for several days before death occurred.

The elimination of *T. infestans* from houses has been on a large scale in Brazil. The authors advise the use of 0.25 per cent S.P.N. in powder for use in habitations, and show that at this concentration the risk of toxicity to man is exceedingly small.

[It is added in a footnote that in the United States a product having the same chemical formula as Sulphos is called Thiophos but the authors suggest that the higher toxicity of the latter according to published data seems to indicate that the two products are not absolutely identical.]

C. M. HARRISON

WILDER, J. H. H. Experimental Use of Dimidium Bromide (15-3) in the Treatment of *T. cruzi* Infection in Zebu Cattle. *J. Comp. Path. & Therap.* 1949 Jan v 59 No. 1 45-53.

LEISHMANIASIS

KIRK, R. Studies in Leishmaniasis in the Anglo-Egyptian Sudan. X. An Interesting Strain of *Leishmania*. *Trans Roy Soc Trop Med & Hyg* 1949 Mar, v 42, No 5, 501-2

In a previous paper (this Bulletin, 1945, v 42, 875) the author described a case of leishmaniasis in a monkey (*Cercopithecus aethiops*) infected intraperitoneally with the Sudanese kala azar which had previously been passaged from man through two other monkeys. The monkey showed symptoms of visceral leishmaniasis combined with cutaneous and mucocutaneous lesions. In order to follow this curious condition further, four monkeys of the same species were inoculated with material from the first monkey as follows: two intraperitoneally with splenic pulp and two subcutaneously with material from the nasal lesion. All the material contained numerous leishmanias. Observations in the course of four years after inoculation of the infected material revealed no symptoms of disease in any of the four monkeys and on post mortem examination there was no evidence of a leishmanial infection. The author concludes that the strain of leishmania lost its virulence for monkeys in the course of passages through these animals when it went through a stage producing metastatic cutaneous and mucocutaneous lesions. C. A. Hoare

GOPPA, D. M. & CHATTERJEE, J. R. Kala Azar with Purpura, a Case Report. *Calcutta Med J* 1949 Jan, v 46 No 1, 24-6

HO, I. A., SEONG, Tsung-hen & LI, Y. Rate of Disappearance of *Leishmania* in Kala-Azar Patients under Urea Silbamline Therapy. *Trans Roy Soc*

than of those having twice-weekly injections were negative for example in group (2) after 2, 4 and 6 injections of urea silbamine the percentages showing negative sternal punctures were 78.6 94.6 and 99.4 among those having the injections weekly and 41.7 77.7 and 98.3 among those having them twice weekly. The blood picture also improved after a smaller number of injections when the injections were given at weekly intervals.

In a follow-up of patients over a period of three years (one year after the last patient was treated) 4.1 per cent. of the patients on twice-weekly injections and 1.3 per cent. on weekly injections relapsed. Another group of 528 patients who returned for examination were in normal health. 353 had negative sternal punctures and 45 negative spleen punctures.

L. E. Napier

DE ARRUDA, W. DA COSTA, F. C. NUNES, S. & ROSENFIELD, G. Leishmaniose visceral americana. Constatação de dois casos. [Two New Cases of American Visceral Leishmaniasis.] *Brasil-Médico* 1949 Feb. 19 & 20 v. 63 Nos. 8 & 9 64-5 1 map.

The English summary appended to the paper is as follows —

Two new cases of American visceral leishmaniasis are presented. They were diagnosed by the finding of leishmanias in spleen material.

"With all the probability one of these patients had the disease in the Brazil-Bolivia Railway area, Bolivia, and the other is original from a new focus of the disease in Matto Grosso.

LEPROUX, G. La leishmaniose cutanée au Soudan français. Fréquence de la forme sèche papulo-tuberculeuse [Cutaneous Leishmaniasis in the French Sudan. Prominence of the Dry Form.] *Bull. Soc. Path. Exot.* 1948, v. 41 Nos. 9 & 10 622-7

Oriental sore was first reported from French West Africa in 1911 in the Niger Colony; later more cases were reported from there and from Chad, but none from the French Sudan to the West. This was surprising in view of the similarity of the nature of the country. However in 1944 reports were received from a young doctor Dr Verges, who had been familiar with the disease in Zinder, that the condition was relatively common in Timbuktu. Later a case of the dry papular form in an official from Legon and another case of the ulcerating form were diagnosed by Dr Kervran at Bamako. As a result of these observations a circular on the diagnosis of this disease was sent to all doctors in the French Sudan and, in 1945, 138 cases were reported and the diagnosis confirmed at Bamako. Cases undoubtedly also occur beyond the administrative frontiers of the Sudan.

The commonest was the classical ulcerative form which could be confused with craw-craw or ecthymatous ulceration or when it occurs in the legs, phagedenic ulcer.

The form that calls for special mention is the dry form in which the lesion gives the name papulo-tubercular. The lesions are large round red raised papules covered by a scab which rapidly re-forms if scratched off. They show no tendency to ulceration and usually heal in a few months time leaving a distinct scar.

Four species of *Phlebotomus* *P. perniciosus* var. *papalis* *P. macleayi* *P. dydi* and *P. fuscus* have been found. Samples of the *P. papalis* group are widely scattered in the Sudan, but are difficult to catch. It is apparently the only sandfly that is pathogenic to man. *Phlebotomus* *Phlebotomus* and its distribution coincides with that of cutaneous leishmaniasis.

Tartar emetic was used in the treatment of cutaneous leishmaniasis with satisfactory results. The dry form has been treated by dermal infiltration of

quinacrine [mepacrine] thrice weekly, with mediocre results. the ulcerative form was treated with many different antiseptics and caustics also

L E Napier

FEVERS OF THE TYPHUS GROUP

Fox, J P The Relative Infectibility of Laboratory Animals and Chick Embryos with Rickettsiae of Murine or of Epidemic Typhus *Amer J Hyg* 1949, May, v 49, No 3, 313-20, 1 fig [14 refs]

The author has investigated the possibility of obtaining animals more suitable than guinea-pigs for the isolation of typhus rickettsiae. The results obtained and the technical methods employed will be of great interest to workers on the typhus fevers.

The most important findings obtained when freshly isolated strains of rickettsiae were used are as follows —(1) The cotton rat was slightly more susceptible than the guinea-pig to murine and epidemic strains of rickettsiae. (2) The mouse was as susceptible as the cotton rat to murine strains, but relatively insusceptible to epidemic strains. (3) The chick embryo was as susceptible as the cotton rat to murine strains, but usually less so to epidemic strains, though after repeated egg passages epidemic strains became equally infectious for rats and embryos. (4) The cotton rat was considered to be the animal of choice for the isolation of both epidemic and murine infection from material obtained in the field, though the mouse is equally suitable for murine strains. (5) Rickettsiae persisted for long periods in the brain and kidney of cotton rats infected with epidemic and murine typhus, yolk-sac cultures being obtainable from suspensions of these organs up to 60 days. This persistence suggests that the existence of infection in the rats may be capable of detection by serological examination before attempts are made to isolate rickettsiae.

The establishment of recently isolated strains by yolk-sac cultures was often difficult, bacteriological contamination caused failure in 52 out of 245 passage series, and in most cases two or even three successive passages were needed before positive results were obtained.

John W D McGaw

Snyder, J C, Murray, E S, Yeomans, A, Zarafonitis, C J D & Wheeler, C M The Effect of Typhus Vaccine on the Numbers of Rickettsiae in Body Lice of Typhus Patients *Amer J Hyg* 1949, May, v 49, No 3, 340-45, 1 fig [14 refs]

The material employed in this important study consisted of pooled suspensions each made from 200 lice which had been allowed to feed for ten days on a typhus patient in a Cairo hospital. The suspensions had been rapidly frozen and stored in sealed glass ampoules which were kept in an alcohol-dry-ice cabinet till they reached the laboratory in the U.S.A. where they were rapidly thawed and diluted with sterile fresh milk so as to make suspensions containing material from 10 lice in each cc.

After the suspensions had been subjected to the usual laboratory tests a series of 10-fold dilutions were prepared in sterile skim milk, and 0.25 cc of each dilution was inoculated intraperitoneally into each of four cotton rats. Six of the suspensions were of lice which had fed on typhus patients who had been vaccinated against the disease and 10 were from non-vaccinated patients.

Each of the inoculated rats was challenged three weeks later with a dose of *Rickettsia prowazekii* 2-4 times the minimum needed to kill unprotected rats. The survival of a rat was regarded as showing that it had received at least one

viable rickettsiae in the inoculum. A calculation based on the degree of dilution that protected half of the inoculated rats of each group showed that on the average there were 10 viable rickettsiae in each cc. of louse suspension prepared from lice fed on the six patients who had been vaccinated, whereas there were 2,200 in each cc. originating from ten patients who had not been protected.

This striking difference was regarded as justifying the speculation that vaccination of a community with a Cox type vaccine followed by one or more "booster" doses of the vaccine would suffice to reduce sharply the development of an epidemic of typhus fever even if no measures of disinfection were employed.

The authors' study was already in progress when their attention was drawn to the report by WOLFE *et al.* which strongly supported the same view (see this Bulletin 1944 v. 41: 741).
 Job W. D. Meyer

WEYER, F. Versuche zur Uebertragung von Rickettsien auf Mäuseflöhe
 [Experiments in the Transmission of Rickettsiae to the Mouse Flea.] *Zent. f. Bakt. Abt. I Orig.* 1949 v. 153: 115-21

The author has found that the mouse flea (*Xenopsylla segnis*) readily becomes infected with *Rickettsia mooseri* and certain strains of *R. prowazeki* by feeding on infected mice and by intrarectal inoculation with infective material.

The technique of intrarectal inoculation of fleas is more difficult than in the case of lice.

As already described by the author in connection with experiments on other insects (this Bulletin 1949 v. 46: 624) intracellular strains of rickettsiae virulent for mice have often become extracellular and non-virulent after transfer through the flea and after transfers through lice. This change in the characteristics of the organisms is regarded as being due either to a true mutation or to the coexistence of extracellular and intracellular strains in the original infection, one or other strain becoming dominant according to the prevailing environmental conditions.

Fleas as well as ticks were found susceptible to the rickettsiae of Q fever and the author suggests that fleas may play a part in the transmission of the disease.

Job W. D. Meyer

RANDOLPH, R. M., O'DON, L. J. & EADES, R. B. Entomological Studies on Typhus in Lavaca County, Texas. *Texas Reports on B. & M.* 1948 v. 6 No. 4: 444-52. 9 figs.

This paper deals with the incidence of and the control by DDT in pyrethrin dust of certain flea-borne and mite parasites of *Rattus rattus* in urban and rural areas of Lavaca County, Texas during the period October 1945 to September 1946.

Throughout the year approximately 70 live rats per month from an untreated town and 10 rats per month from each of two treated towns were examined for ectoparasites. The treatments which consisted of dusting known and potential rat runs with 10 per cent DDT in pyrethrin dust at the rate of 1 lb. dust per small café or similar premises, 1 lb. dust per residence and 2 1/2 lb. dust per warehouse mill etc. were made in November, February and July. A similar study carried out in rural areas involved twenty long farms, 1 of which remained untreated while in eighteen the rat runs were dusted with 10 per cent DDT in pyrethrin dust at the rate of 1 lb. rat 1 lb. dust per farm. About three rats per farm were examined each month between April and September after apparently one application of dust.

Both *Xenopsylla cheopis* and *Leptopsylla segnis* showed significant reductions in the treated towns, but only the *X. cheopis* index was lower on the treated farms. There was no clearly detectable effect of the DDT on *Echinophaga gallinacea*, nor on the louse *Polyplax spinulosa*, nor on the mite *Liponyssus bacoti*.

The following additional ectoparasites are recorded from *Rattus rattus* — *Pulex irritans*, *Ctenocephalides felis* and *Nosopsyllus fasciatus*, and the mites *Echinolaclaps echidninus*, *Laelaps nuttalli*, *Eulaclaps stabularis*, *Dermanyssus gallinae* and *Atricholaclaps megaventralis*.
D S Bertram

Fox, J P The Antibody Response of Rabbits to Rickettsial Vaccines in Water-in-Oil Emulsion *Amer J Hyg* 1949, May, v 49, No 3, 303-12, 2 figs [31 refs]

The incorporation of aqueous suspensions of various antigens in a water-in-oil emulsion has been found to enhance, and often to prolong, the antibody production resulting from the use of the antigens as vaccines.

Employing technical methods described in the paper the authors found that such vaccines, prepared from yolk-sac cultures of rickettsiae of epidemic and murine typhus and of Rocky Mountain spotted fever, caused great enhancement and prolongation of the complement-fixing and mouse-neutralizing antibody responses in the sera of vaccinated rabbits as compared with the responses obtained with aqueous-suspension vaccines.

The emulsion type of vaccine did not enhance the responses when tested on eastern cotton rats, and an emulsion type of murine vaccine did not give rise to a higher antibody production in man than the usual vaccines, though the antibodies persisted longer.

Vaccines prepared in the same way from *R. orientalis* gave rise to only a moderate resistance in guinea-pigs to challenge infection, and to no constant resistance in mice and cotton rats. The author states that more satisfactory protection might possibly result if a better original antigen could be obtained.

John W D Megaw

FOX, J P, RICKARD, E R, VAN DER SCHEER, J & COX, H R Antibody Response to Vaccination against Murine Typhus *Amer J Hyg* 1949, May, v 49, No 3, 321-39, 1 fig [41 refs]

The authors state that there are no published results of the use in man of murine-typhus vaccines of the yolk-sac type.

In the present study several types of vaccine were employed, all were derived from the same yolk-sac suspension. Each type was tested on groups of 19 to 25 persons, and altogether more than 400 persons were used in the tests.

Complement-fixation and rickettsia-agglutination tests were carried out before and after vaccination, the latter were found more sensitive than the former.

A single dose containing an adequate amount of antigen in the aqueous state gave results only slightly inferior to those resulting from the same amount of antigen given in three divided doses at intervals of one week.

Concentration of the vaccine by the sulphate or methanol method reduced the volume of the inoculum without affecting its potency. The water-in-oil emulsion [see Fox above] did not give rise to as high antibody titres as did the aqueous vaccine, but the immunity persisted longer. Vaccines precipitated by alum and zinc gave inferior responses. The responses to booster doses of the vaccines were much the same irrespective of the method employed in the primary vaccination, the responses were better 50 weeks after the primary vaccination than 22-28 weeks after.

John W D Megaw

A list of the hosts for each tick includes mice of the genera *Peromyscus*, *Microtus* and *Zapus*, skunk, opossum, rabbit, shrew, grey squirrel, *Rattus norvegicus*, red fox, cottontail, weasel, deer and chipmunk. The flying squirrel (*Glaucomys volans*) and the muskrat were not found to be infested with ticks. Birds (the brown-thrasher, cuckoo, catbird, song-sparrow, towhee and American thrasher) were parasitized only by *I. muris* and a few *I. leporis-palustris*. Some twenty other species of bird were found free of ticks.

Only *D. variabilis*, *I. dentatus* and *I. scapularis* were taken on man.

No adult ticks were found on birds and few on the mice, but many of the larger mammals carried both immature and adult ticks.

D. variabilis was the predominant species on the red fox (*L. ulpes fulvus*) and the raccoon (*Procyon lotor*). It was the principal tick occurring as adults on the fox. Its immature stages were found mainly on *Peromyscus leucopus* and *Microtus pennsylvanicus*. Instances are given of these ticks being numerous on grass around horse manure and a sheep's skull on the door of a pump-house and on the timber and grass of a boat slip in vicinities where it was otherwise not abundant. A larva with its rostrum inserted into a nymph engorging on *Peromyscus* is recorded.

Dragging a sheet across the ground yielded large catches of *D. variabilis* and a few specimens of *I. scapularis*, but all other species of tick were obtained only from their hosts. Although, therefore, *D. variabilis* would appear to be the most prevalent tick species when collections are made in this way, *I. muris* proved to be the predominant tick on many of the small mammals and birds.

In 1948, *D. variabilis* occurred in highest density on the red fox in May and June (35.8 and 23.0 adult ticks per host) while the infestation peak for *I. scapularis* on the fox was in April. Regional differences in the abundance of some of the tick species are discussed.

D. S. BERTS

BLANC G. & BRUYEAU J. "Un réservoir de virus de la Q-fièvre en Algérie: la tique bovine *Hyalomma marginatum*." [Natural Infection of the Bovine Tick, *Hyalomma marginatum* with the Rickettsia of Q Fever]. *Bull. Acad. Nat. Méd.* 1949 v. 133 No. 56: 115-17, 5 charts.

Using a pooled suspension of 17 of the common bovine ticks, *Hyalomma marginatum*, for the subcutaneous inoculation into the loin of guinea pigs the author isolated a strain of *Rickettsia burnetii*.

The ticks were collected at Maison Carrée in Algeria.

The two guinea pigs originally inoculated gave unusual reactions: there was slight fever within the first 4 hours accompanied by a hard haemorrhagic oedema and local lymphangitis at the site of the inoculation; there was only slight enlargement of the spleen. 1 guinea pig inoculated with spleen substance taken on the 6th day from the primarily inoculated guinea pigs there was a delayed febrile reaction and the animals became immune to an Algerian strain of Q fever rickettsiae. On further passages the reaction became typical and numerous rickettsiae were found in smears from the local lymph.

The authors express a preference for subcutaneous inoculation despite the need for further passages before rickettsiae can be detected in smears.

Joh. W. D. MEYER

PERRY T. L. "Histopathologic Observations in a Fatal Case of Q Fever." *Arch. Pathology* 1949 Apr. 47 No. 4: 361-3, 3 figs.

"Only six fatal cases of Q fever are on record, but see this *Bulletin* 1949 v. 46: 351 in which reference is made to seven deaths, mostly in old persons.

Autopsies are reported to have been carried out on four of the cases, but in these, as in the present case, lesions not connected with Q fever probably exerted an unfavourable influence on the course of the disease

In the present case, of a man aged 43, there was pronounced arteriosclerosis of the coronary artery and an old organized myocardial infarct. The lungs were in a state of bronchopneumonia with a predominantly mononuclear cell exudate and there was focal hypoplasia of the bone marrow, these were the only lesions regarded as being due to Q fever. In the areas of gross consolidation of the lungs most of the cells in the exudate were large mononuclears, there were a few neutrophile granulocytes and lymphocytes. In some patches there was a haemorrhagic exudate, and in many of the small isolated pneumonic areas neutrophile granulocytes predominated, but large mononuclears and lymphocytes also occurred in varying proportions *John W D Megaw*

HUEBNER, R J, JELLISON, W L, BECK, M D & WILCOX, F P. Q Fever Studies in Southern California. III. Effects of Pasteurization on Survival of *C burneti* in Naturally Infected Milk. *Pub Health Rep* Wash 1949, Apr 22, v 64, No 16, 499-511

By an extensive series of carefully controlled experiments it was shown that milk infected with *Coxiella* [*Rickettsia*] *burneti* became free from infection when pasteurized by the "high-temperature, short-time" method in which a minimum temperature of 160°F was maintained for 15 seconds.

With the "holding-vat" method in which a temperature of 143°F was maintained for 30 minutes the milk was freed from infection in three out of four experiments, in the case of failure it was found that three out of 20 guinea-pigs inoculated with the pasteurized milk gave positive complement-fixation reactions for Q fever.

Among 32 samples from bottles of vat-pasteurized milk on sale in the market it was found that three were presumably infected.

It is concluded that further work needs to be done to determine safe methods for eliminating the risk of infection by milk. *John W D Megaw*

YELLOW FEVER

CHWATT, L J. *Aedes* (*Stegomyia*) *pseudoafricanus* sp nov. a New Species of *Aedes* from the Coast of Nigeria (British West Africa). *Nature* 1949, May 21, 808-9

Of interest in relation to the precise identification of mosquitoes related to the yellow fever problem.

SMITHBURN, K C, HADDOW, A J & LUMSDEN, W H R. An Outbreak of Sylvan Yellow Fever in Uganda with *Aedes* (*Stegomyia*) *africanus* Theobald as Principal Vector and Insect Host of the Virus. *Ann Trop Med & Parasit* 1949, Apr, v 43, No 1, 74-89, 1 map [17 refs]

In previous papers [this *Bulletin*, 1947, v 44, 992] SMITHBURN and his colleagues described the results of investigations which indicated that yellow fever is endemic among monkeys in the Semliki Forest in Western Uganda and that *Aedes africanus* Theobald, which was found to be harbouring the virus, was the probable insect vector. The optimum biting level of this mosquito is at some distance above ground in the main forest-canopy, and its period of maximum biting activity is at a time when human beings are not often in the forest. Immunity studies in the human population showed a high rate of

infection among young children, who rarely enter the forest. The known vector of the disease among the human population in this area is *Aedes simpsoni* which occasionally enters the canopy of the forest edge.

In order to obtain further information on the mechanism of infection from animal to animal and to man, susceptible rhesus monkeys were exposed on plat forms in the forest canopy. In a previous paper [see this *Bulletin* 1949 v 46 457] the author and his colleagues described the infection of such a monkey at Zika, near Entebbe in 1947. From May to October 1948, infection with yellow fever occurred in monkeys in 4 of 9 stations in one area of the forest covering several square miles. No infections occurred in the same period among monkeys at 20 other sentinel posts in the Semliki Forest.

During the period July to October *Aedes africanus* caught in the forest canopy, were found to harbour virus, and when some lots were allowed to feed on normal monkeys, the latter became infected with yellow fever virus.

The monkey which received an injection of 133 *Phlebotomus* of various species caught in the first week of July in the same area, developed yellow fever at least 34 days later. The injection of suspensions of 4,234 other mosquitoes and 1,024 insects other than *Phlebotomus* spp. into a total of 10 non-immune monkeys gave rise to no infection.

F O MacCallum

RABIES

NOTICER R. Contribution to the Study of Bovine Paralytic Rabies in Venezuela. *Canad. J. Comp. Med.* 1947 Nov v 11 No. 11 335-7

First described in Brazil in 1911 paralytic rabies of cattle is a communicable disease which today affects most countries in South America and which as established between 1871 and 1899 is transmitted by blood-sucking bats. As a result of heavy losses among cattle in 1938, the Government of Venezuela began taking energetic measures to control the spread of the infection. Among these measures the principal was the vaccination of cattle in the areas involved. Inasmuch as the causal agent of the condition was found to possess certain biological and immunological characteristics which the virus of canine rabies lacked, two strains of the local paralytic virus were chosen for the production of vaccine and, after fixation, used in calves from 6 to 9 months old to ensure adequate supplies. The strains employed were (1) the Bolivar virus originating in the southern parts of Venezuela, from the State of Bolivar and (2) the Maturin virus deriving from the area where paralytic rabies of cattle was originally diagnosed in the country in 1938. The incubation period of the former strain became fixed for calves at 5 days on and after the 52nd passage; that of the latter at 6 days on and after the 14th passage. Both viruses in a dilution of 1 in 5,000 are lethal for the calf.

The finished vaccine is a 15 per cent emulsion of brain and spinal cord, the virus being inactivated by exposure to the action of phenol and heat at 37°C. As assessed by the Habel mouse test the antigenic potency is invariably higher than that required for a standard anti-rabies vaccine in the U.S.A. Moreover the vaccine has been shown to confer on mice better protection against the Bolivar virus than one containing Pasteur fixed virus.

In conclusion, paralytic rabies in Venezuela has been eradicated by satisfactory results. The disease is now under control and has ceased to be a veterinary problem because of the present vaccination of all susceptible animals.

G. Stuart

IONESCO, D Recherches sur la maladie d'Aujeszký [Investigations on Aujeszký's Disease] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2, 122-34, 1 fig [20 refs]

The English summary appended to the paper is as follows —

"A new virus 'AUJESZKY' was identified from a cat, with incubation period of 2 days in rabbit and guinea-pig By rubbing the shaved skin of young dogs especially, vesicles appear which very rapidly change into pustules and finally are covered by crusts These vesicles are produced with this virus and another virus AUJESZKY Nr 1, identified by the author in 1934

"The production of these vesicles creates immunity in dogs, immunity ascertained by the virulicidal action of blood serum (1/5) and by resistance to new infection

"There does not exist a cross immunity between AUJESZKY's disease and rabies

"Acquired immunity in dogs, due to friction or scarification of skin with formation of vesicles, obliges us to consider the AUJESZKY virus close to the herpetic virus and to add to the known neuro-organotrope characters of the virus, a new dermatrope character"

PLAGUE

ROCKENMACHER, M Relationship of Catalase Activity to Virulence in *Pasteurella pestis* *Proc Soc Exper Biol & Med* 1949, May, v 71, No 1, 99-101

"1 Optimal conditions for catalase activity in *P. pestis* were determined and the catalase activity of 14 virulent and 11 avirulent strains was measured

"2 The catalase activity of virulent strains was significantly greater than that of the avirulent strains

"3 The possibility of using catalase activity as a screening test for determining virulence *in vitro* has been indicated"

DAVIS, D E & FALES, W T The Distribution of Rats in Baltimore, Maryland *Amer J Hyg* 1949, May, v 49, No 3, 247-54, 4 figs

The survey described in this paper deals only with the census of brown rats (*Rattus norvegicus*) in Baltimore The roof rats (*R. rattus*) were far less common The basis on which the number of rats was estimated is stated as "an evaluation of the signs of rats in yards and houses and calibration with the number of rats trapped" It is assumed that this method has an error of about 10 to 20 per cent In the actual census a "trained observer examined the block for signs of rats, such as holes, droppings, runways Since in most cases these signs are located along the alley or can be seen easily from the alley, it was possible, therefore, merely to go along the alley to make the estimate The construction in some blocks was such that as good an estimate could be obtained from a car as by walking, in these cases the trained observer drove slowly along the alley"

In September, 1947, a random sample of 359 blocks was surveyed in the residential part of Baltimore and it was estimated that the total number of rats was between 119,000 and 158,000 On the basis of other sources of information it was estimated that there were about 26,000 rats in the commercial areas of the city The number of rats in each residential section varied directly with the number of houses needing major repairs

The wide range of variation in the rat population is shown by the estimate that in 156 blocks no rats were detected. In 181 blocks there were 5 to 73 rats and in 22 blocks there were 100 to 200.

The average number of rats in each dwelling unit was 0.583, the range in the different census tracts being 0.071 to 1.405.

In a previous estimate made in 1944 by a different method, the total number of rats was believed to be about 420,000, so that although the figures are not strictly comparable there must have been a considerable decrease since that time. This is attributed to extensive rat-proofing, poisoning, and better disposal of garbage and refuse.

The present human population of Baltimore is not stated, but it appears to be about one million because it is mentioned that even if there were 200,000 rats in the city this would mean at most one rat per five persons.

John H. D. Meyer

MACCHIARELLO, A. Evaluación de nuevas drogas para el tratamiento y prevención de la peste especialmente bubónica. [Evaluation of New Drugs for the Treatment and Prevention of Plague, especially Bubonic.] *Rev. Oficina Sanitaria Panamericana*, 1949, Apr. v 23, No. 4 329-35. (Numerous refs.) English summary.

A comprehensive review.

CHOLERA

GAULD R. L., SCHLIKOVAN A. S., JACKSON Elizabeth B., MANNING Mary C., BATEON H. C. & CAMPBELL, Charlotte C. Chloramphenicol (Chloromycetin) in Experimental Cholera Infections. *J. Bacteriology* 1949 Mar. v 57 No. 3, 349-52.

The results are submitted together of studies on the action of chloramphenicol (Chloromycetin) on experimental cholera infections which were carried out at the Army Medical Department Research and Graduate School, Washington D.C. and at the Research Laboratories of Parke Davis & Co., Detroit Michigan.

In vitro tests showed the drug to inhibit completely the growth of Inaba and Ogawa strains of *V. cholerae* in a concentration of 0.005 mgm./ml. of single strength brain heart infusion broth at pH 7.6. 50 per cent. inhibition as determined by turbidimetric assay was obtained with 0.00025 mgm./ml.

White mice were used for tests in which the drug was administered at various periods before and after an intraperitoneal challenging dose of a suspension of a culture in 5 per cent. hog gastric mucin. Several levels of dosage were employed. At Washington, in one series of tests in which the drug was given subcutaneously at periods from 1 hour preceding the challenging dose to 4 hours after there were only 2 deaths in 60 mice compared with 50 deaths in 60 untreated controls. Administration 6 hours after was not effective. At Detroit tests were carried out with chloramphenicol and sulphadiazine administered by stomach cannulae 1 and 6 hours after infection. Of those given chloramphenicol only 3 out of 170 died. In the sulphadiazine series 25 out of 60 died and in the control, untreated, group 22 out of 30.

A single dose of chloramphenicol at 4 hours after infection was also found effective: only 3 out of 178 mice dying after dosage 10.5 to 20 mgm. against 17 out of 30 controls. Sulphadiazine had considerable but lower value.

A single dose of chloramphenicol 4 hours after infection had little beneficial effect.

In discussing the findings in relation to their application to the treatment of human cases of cholera the authors remark that "No chemotherapeutic drug could be expected to be effective in this disease in man once dehydration had occurred unless it was augmented by measures designed to restore water, salt and protein balance. In the experiments in Detroit, chloromycetin was effective when given directly into the stomach of the mice. However, the vomiting in human cholera might well exclude the administration of the drug *per os* and it would probably be necessary to give it parenterally. Because of the extremely rapid development of this disease in man chloromycetin treatment would have to be instituted early. Indeed it is possible that if this drug proves to be of any value in the human disease its principal use may be as a prophylactic agent in the face of an epidemic."

[This recognition of factors which may affect the chemotherapy of cholera is timely. The same considerations are likely to apply in the case of other drugs that may be tried. A clinical trial to determine the actual field of usefulness of the drug, is however, desirable.]

J Taylor

SHRIVASTAVA, D L, SINGH, G & AHUJA, M L. Immuno-Chemical Studies of *Vibrio cholerae*. A Preliminary Note. *Indian J Med Res* 1948, Oct, v 36, No 4, 409-13 [14 refs]

Protection experiments against intraperitoneal infection of mice with *V. cholerae* were carried out with polysaccharides extracted from the organism by three different methods. The methods of extraction used were (1) WHITE's method [this *Bulletin*, 1936, v 33, 861] in which the growth on agar is digested with papain at 60°C and the protein subsequently removed by treatment with saturated picric acid solution, (2) SHRIVASTAVA and SEAL's method [*ibid*, 1937, v 34, 784] of treatment of the concentrate from broth, and removal of the protein by shaking with chloroform and butyl or amyl alcohol, and (3) the phenol method (PALMER and GERLOUGH, *Science*, 1940, Aug 16, 155) in which the acetone dried growth is treated with 90 per cent phenol.

White mice were immunized with two doses of 0.2 cc of a saline solution of the particular polysaccharide given at intervals of one week and a challenging measured dose of a six-hour culture of a selected strain of *V. cholerae* was given in 5 per cent mucin one week later. The total immunizing dose employed in different tests varied from 0.059 to 0.300 mgm of the polysaccharide.

The best results were obtained with the extract prepared by the phenol method, of which the details are given in the paper. The immunized animals were able to withstand a test infection of at least 200 lethal (L50) challenge doses. The results compared favourably with those obtained in controls given the ordinary type of cholera vaccine [the reference to WHITE is incorrectly shown as p 157, instead of p 229].

J Taylor

BOSE, H N & CHAKRABORTY, D C. Bactericidal Action of Metallic Copper on *Vibrio cholerae*. *Ann Biochem & Exper Med Calcutta*, 1948, v 8, Nos 3/4, 83-8.

The action of metallic copper on *Vibrio cholerae* was tested by placing strips of copper foil in suspensions of the organism in water and subsequently subculturing at intervals of half an hour. In distilled water, the vibrio could not be recovered later than 1-hour in the presence of copper, while it survived for 48 hours in controls. In filtered tank water with a nitrogen content of 0.4 mgm per 100 cc it could not be recovered later than 1½ hours but survived for 15 days in the absence of copper. Other intestinal organisms survived for longer periods.

When the copper foil was allowed a period of 2 hours contact with water and was then removed before the addition of the vibrio suspension, the organism could not be recovered later than 30 minutes. When contact had been for 4 hours, survival was for 15 minutes only. Other tests showed that the surface area of the copper foil in relation to the volume of water appeared to affect the rapidity of death of the vibrio. A higher nitrogen content of the water lengthened its survival.

When peptone water or Douglas broth were prepared with distilled water kept in contact with copper foil for 48 hours, no lethal effect on *V. cholerae* was shown, the organism still being recovered after 15 days.

Tests carried out in highly polished copper vessels instead of by addition of copper foil also showed lethal effect on the vibrio which could not be recovered from filtered tank water later than 1½ hours. The periods for other intestinal organisms were longer. In these experiments chemical tests for copper were negative.

It is suggested that water should be stored in clean copper vessels for 4 to 6 hours during periods of epidemic cholera.

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

VIEREMA, H. J. & KIAM, L. P. Enkele gevallen van amoebiasis. [Some Cases of Amoebiasis.] *Viertel Tijdschr. v. Geneesk.* 1949 June 25 v. 83 (a) No. 28 7143-6. [Refs. in footnotes.]

The English summary appended to the paper is as follows:—

"Four cases of amoebiasis, two of which autochthonous are described. One of the patients had a colon carcinoma as well whilst one of the others had a liver abscess when admitted. In two cases the nature of the disease had been misjudged for years.

Amoebic dysentery in the Netherlands is usually of tropical origin, directly or indirectly. Therefore the repatriation of tens of thousands of civilians after the war and the return of our troops from Indonesia are expected to give rise to an increase in amoebiasis. In this connection the importance of faeces examination is stressed. The significance of HUGHES and SATTLERGRUBER'S view on the commensal phase of *E. dysenteriae* (minuta forms) is explained, as well as the necessity of completing the smeltzer treatment with a course of yatrien (chinfofon or anayodin).

REARSON, LUCY V. & BARTGIS, IDA L. The Cultivation of the Small Race of *Entamoeba histolytica* with a Single Species of Bacteria. Research Notes.] *J. Parasitology* 1949 Apr. v. 35 No. 1, 718-19.

Ten tubes of Locke-egg medium containing rice-starch and bacteria ("organism 1") were seeded with 10 cysts each of small race of *Entamoeba histolytica* isolated by micro-manipulation from the stool of a patient with a symptomless infection. Seven of the 10 tubes became positive and one of these has been maintained for a year in sub-cultures. The original infection and the cultures were proved to belong to the small race of the organism. Cysts measured 7 µ and the trophozoites of the cultures 7-9 µ.

An interesting effect of the amoeba upon the rice grains was noticed. If particles are ordinarily enveloped in gluten, and few discrete grains are visible when growth of the amoebae begins, much of the gluten disappears and

profusion of discrete granules is left. This phenomenon is thought to be the result of the action of an enzyme derived from the amoebae which liberates the starch grains from their gluten envelope [see also this *Bulletin*, 1948, v 45, 517, 787] *P C C Garnham*

GRIFFIN, A M & McCARTEN, W G. Some Methods for the Quantitative Study of Entozoic Amoebae in Cultures. *J Parasitology* 1949, Apr, v 35, No 2, 193-8

A method has been devised to facilitate the counting of amoebae in cultures. Counts are performed in a cerebrospinal fluid counting chamber 0.2 mm deep with the Fuchs-Rosenthal ruling. The amoebae are grown in liver-serum-broth (10 cc) with purified rice starch (25 mgm). This rice is prepared very carefully in order to get rid of extraneous material, it consists of individual grains and suspends uniformly. The medium is inoculated with the amoebae, incubated and after an optimum period 20 mgm more of starch are added, followed by further incubation for 1 hour to permit the amoebae to gorge themselves. The sediment is suspended by "snapping" the tube or by aspiration with a pipette, 1 cc of 10 per cent formalin is added and the mixture is heated for 10 minutes at 70°C. The amoebae are again suspended and a sample is taken for a count. It may be necessary to centrifuge the fluid, if the culture is too sparse.

Experiments showed that this treatment with formalin followed by heat was the only satisfactory method to render the starch invisible and thus permit of easy counting of the organisms. These treated cultures could be stored and counted at any convenient time later. The manipulations result in the loss of some of the amoebae, amounting in some instances to 25 per cent but the relative counts are said to remain constant. *P C C Garnham*

BEAVER, P C & DESCHAMPS, G. The Viability of *E histolytica* Cysts in Soil. *Amer J Trop Med* 1949, Mar, v 29, No 2, 189-91

It is generally held that pollution of the soil with human faeces containing cysts of *Entamoeba histolytica* is one of the sources of amoebic infection. However, no observations have been made on the survival of the cysts in the soil. In the present paper the authors record experiments on the viability of these cysts, carried out in Venezuela.

Cysts, obtained from stools of carriers, were washed by repeated centrifugation in distilled water, after which the sediment was rinsed on to samples of damp soil kept in glass cylinders (15×15 cm) and worked to the depth of 10-15 mm from the surface. As a control, cysts concentrated by zinc sulphate flotation were washed and kept in 125 cc flasks with well aerated distilled water. At intervals of 2 days samples of the soil were suspended in distilled water, strained through gauze, concentrated by flotation, rewashed and inoculated in BALAMUTH and SANDZA's culture medium, [this *Bulletin*, 1945, v 42, 999], to test for the presence of viable cysts. At the same time cultures were made of the control cysts. The cultures were examined 24 and 28 hours after inoculation, those found negative on first examination were subinoculated in fresh medium and re-examined.

Five preliminary tests showed that cysts of *E histolytica* could be recovered from the soil by zinc sulphate flotation, that they remained viable in the soil at least 2 days, and that free-living amoebae will not grow in this culture medium at 37.5°C. In three other tests the results were negative, but cultures of the cysts made directly from the stools indicated that the cysts were already not viable, when deposited in the soil. It was also evident that some types of

soil used and a high external temperature (28-34 C.) did not favour the survival of the cysts. The soil used most successfully was dark loam containing over 30-40 per cent. of fine sand. The best results were obtained in three experiments in which cultures of *E. histolytica* with abundant growth were positive after 2, 4, 6 and 8 days. On the other hand in the control tests with aerated water growth in cultures occurred only after 2-4 days. It was thus shown that under certain conditions cysts of *E. histolytica* can survive in soil up to 8 days whereas in clean aerated water their viability does not exceed 4 days.

C. A. Hoare

BEAVER, P. C. & DRACHMANS, G. The Effect of Acetic Acid on the Viability of *Entamoeba histolytica* Cysts. *Amer. J. Trop. Med.* 1949 Mar v 29 No. 2, 193-7 (10 refs.)

In view of the danger of amoebic infection arising from consumption of uncooked foods especially vegetables, the authors set themselves to find a prophylactic chemical which while lethal to *Entamoeba histolytica* cysts after short exposure would be non-deleterious to health, and would not adversely affect the appearance and flavour of the food. They have produced experimental evidence indicating that acetic acid in concentrations used in vinegar (about 5 per cent.) fulfils these requirements.

The tests conducted in Talara Peru, were carried out as follows. Specimens of stools from known carriers of *E. histolytica* containing numerous cysts, were washed repeatedly by centrifugation in distilled water after which the washed sediment was placed in test tubes (about 0.02 cc. in each). Various concentrations of the acid were added so as almost to fill the tube and the contents were mixed by rotation and shaking. At the end of the test period the tubes were centrifuged, the acid was poured off and the sediment was washed repeatedly. Viability of the cysts after treatment was determined by adding to the sediment BALAMUTH and SANDZ's all-liquid culture medium (this *Bullet.* 1945 v 4, p. 999). Cultures were examined after incubation for 36-48 hours and were reported as negative if no amoebae could be found after systematic search of one drop of the sediment. All negative cultures were subinoculated in fresh media. Untreated washed cysts served as controls.

The results of the tests were as follows. A 10 per cent. solution of acetic acid killed the cysts in less than 5 minutes; however this concentration cannot be used for vegetables because it wilts them rapidly and because vinegars containing this concentration are unpalatable. A 5 per cent. solution killed the cysts after treatment for 45 minutes but the time required was too long to be practicable. Finally a 3 per cent. solution was lethal to the cysts in 10-15 minutes, and this concentration would seem to be the most suitable for the treatment of vegetables. Except for radishes there was no change of colour in the vegetables while a change in the flavour of some vegetables did not differ from that acquired by them in salads.

Similar tests made with the local varieties of vinegar one containing 10 per cent. the other about 6 per cent. acetic acid, were in accord. Other tests showed that 70 per cent. citric acid and 21 per cent. lactic acid had no deleterious effect on the cysts.

It is concluded that since 15 minutes contact with 3 per cent. acetic acid kills not only the cysts of *E. histolytica* but also certain pathogenic bacteria (e.g. food poisoning staphylococci, *Shigella dysenteriae*, *Salmonella* etc.) it would appear to be well suited for chemical treatment of food.

C. A. Hoare

STEWART, G T Nature of the Action of Emetine upon *Entamoeba histolytica*
[Correspondence] *Nature* 1949, May 28, 842, 1 chart

The author investigated the action of emetine hydrochloride on *Entamoeba histolytica* *in vitro*, (a) in cultures in horse serum and rice starch, and (b) in suspensions prepared from such cultures. Ten strains were used and the amoebae were accompanied by different bacterial flora (e.g., one strain was grown with *Bact coli* and *Cl welchii*). A dilution of above 10^{-7} of emetine had no effect on cultures, dilutions below this sterilized cultures in 3 to 7 days, while a dilution of 10^{-4} completely inhibited multiplication of the organisms. The addition of cysteine did not reverse the action of the emetine. Similar dilutions were employed on the suspensions, for the first four hours, the viability of the amoebae was unaffected (as shown by positive sub-cultures), but after this period, degeneration of the organisms began, and by 48 hours was complete.

The author concludes that emetine does not produce an immediate toxic effect upon *E. histolytica* but has an amoebostatic action proportional to its concentration. In fact, surviving amoebae removed after 48 hours from an emetine medium are able to grow normally. P C C Garriham

1 ARMSTRONG, T G, WILMOT, A J & ELSDON-DEW, R The Treatment of Amoebic Dysentery in the Bantu African *Trans Roy Soc Trop Med & Hyg* 1949, May, v 42, No 6, 597-604, 1 fig

11 —, ELSDON-DEW R & MAROT, R J Amoebiasis in the African. A Report on the Treatment of 600 Cases *South African Med J* 1949, May 14, v 23 No 20 369-74, 4 figs (1 coloured)

1 The substance of this paper, with some additional information and conclusions, is to be found in the paper reviewed below

11 Amoebic dysentery is a common and serious disease in male Africans, there were 2,500 admissions for it to the King Edward VIII hospital, Durban, in one year. The response to the usual amoebicides was poor, so tests were made of the efficacy of various drugs alone, or in combination, in the treatment of the condition. The assessment of results was based on immediate repeated examinations of the stools and of scrapings obtained sigmoidoscopically. "Probable successes" comprised those in whom both ulceration and parasites disappeared after treatment, "failures" included "absolute failures" in whom both persisted, and "possible failures" in whom ulcers persisted but amoebae could no longer be found. Follow-up over an adequate period was impracticable. Emetine and diodoquin, either being given alone, were found to produce "probable success" in only about 50 per cent of cases, and "absolute failure" followed in 28 per cent, together concurrently "probable success" was obtained in over 70 per cent, and "absolute failure" occurred in only 2 per cent. E B I produced results comparable to emetine, carbarsone was markedly inferior to diodoquin in efficacy.

Combined penicillin and sulphasuxidine treatment either for a week before emetine and diodoquin treatment, or concurrently, produced a very high percentage of "probable successes" (over 90 per cent of 105 cases), and sulphasuxidine only, with emetine and diodoquin, produced comparable results (88 per cent in 49 cases). Penicillin (6 million units) and sulphasuxidine (600 tablets) for 21 days, without any of the recognized amoebicides given to 11 cases resulted in "probable success" in 82 per cent, and no "absolute failures", the immediate effect was considered to be greater than that of emetine alone. The conclusion is reached that these "antibiotics" [penicillin and sulphasuxidine] are immediately effective in the treatment of amoebiasis.

A R D Adams

ANGIONI, G. Iodoformio nella cura dell'infezione amebica. [Iodoform in the Treatment of Amoebiasis.] *Atti Med. Italiana*, 1949 Apr v 4 No 4 83-8. [1st refs.] English summary (5 lines)

Treatment of amoebiasis by iodoform was brought forward by CASTELLA in 1935 [this *Bulletin* 1936 v 33, 546] and since then several have written extolling its value alone or combined with emetine or alternating with emetine.

The author in this paper records the results of its use in 29 patients in different stages of the infection. The preparation used contained in each tablet 0.05 gm. of iodoform with vegetable charcoal 0.1 gm. Ext. of camomile 0.01 gm. and Ext. lactucae virosae (lettuce) 0.02 gm. with sugar and starch. The odour and taste of the iodoform are thus masked and the drug is well tolerated.

The patients, for purposes of description, were divided into three groups. (1) Nine who had had the infection for 15-20 months, had had other forms of treatment and were in a fair general state of health. These were given 30 cgm. (6 tablets) [presumably daily] for 1st consecutive days then, after an interval of 5 days, a second course of 15 cgm. daily for 10 days. The amoebae were not seen in the faeces after 6-8 days' treatment the general condition improved, abdominal pain diminished and stools were fewer. (2) Eleven in a fair condition generally who had been ill for two years or more and had had various forms of treatment. These were given 30 cgm. daily for 8 days, then a course of emetine (50-70 cgm. in all) followed by 15 cgm. of iodoform daily for 10 days. With one exception, the faeces were all negative for amoebae and remained so for 2 months (later events not mentioned). (3) Nine patients in bad general condition, with anaemia and myocardial complications and who had undergone treatment in various hospitals. These were given iodoform only 10 cgm. daily for 20 days, with a week's rest [whether during the course or after a course and before undergoing further treatment is not stated]. One of these is thought to have been cured, 5 improved, one was unchanged, one had been transferred elsewhere (and presumably could not be followed up) and one died of broncho-pneumonia. None of the patients showed any signs of intolerance.

H. Harold Scott

HAWORTH, R. D. McKENNA, J. & SINGH, N. Constitution of Conessine. Part I. *J. Chem. Soc.* 1949 Apr 631-8 16g

MORETTI, G. F. Hépatite amébienne et conessine. (A propos d'une auto-observation.) [Auto-Observation regarding Amoebic Hepatitis and Conessine.] *Bull. Soc. Path. Exot.* 1949 v 44, Nos. 3/4 172-5.

The author himself suffered from an attack of amoebic hepatitis for which he was treated with conessine hydrochloride 0.5 gm. daily (total 1.5 gm.). By the third day the symptoms and signs of hepatitis had vanished. Another course of 2.20 gm. of the drug over five days was given a week after completion of the first. The toxic side-effects of treatment initially were sweats, giddiness, trembling, dryness of the mouth, and a bitter taste; during the second course these were less evident. Although chronic colitis persisted no amoebae or cysts were found in the stools after treatment.

RIOC in discussion reviewed the treatment of amoebiasis with the total alkaloids of *Holarrhena floribunda* and with the hydrochloride or the hydrobromide of conessine. He considered that the salts in the advocated high dosages produced side effects which precluded their general employment in ambulatory cases and in the G.I.T. The total alkaloid in smaller dosage proved as therapeutically satisfactory were better tolerated, and were therefore more suitable for ambulatory treatment.

H. R. D. Adams

PRADO, F., Jr. Ação dos extratos de *Jacarandá decurrens*, de *Nectandra pichury* e de *Simaruba officinalis* sobre *Entamoeba histolytica* [The Action of Carobinase on *Entamoeba histolytica*] *Brasil-Médico* 1949, Feb 5 & 12, v 63, Nos 6/7, 43-5 [14 refs] English summary

Carobinha is one of the local names of *Jacaranda decurrens*, a tree of Brazil, growing to a height of 4½-6 feet, whose leaves contain a bitter principle with astringent action, an aromatic balsam like coumarin, an acid, carobic acid, a bitter resin and a crystallizable glucoside. An extract obtained from the leaves (and also from *Nectandra pichury* and *Simaruba officinalis*) is known as Carobinase. An aqueous extract and a tincture of the fresh leaves were used by PECKOLT & PRADO in protozoal infections [see this *Bulletin*, 1935, v 32, 657]. [But the figures given in this paper and quoted from a thesis by Valdivieso in 1940 convey little useful information, since it is stated that "forty cases of dysentery were treated, with 86.5 per cent cures in acute forms and 80 per cent in the chronic forms" and that "magnificent results were obtained in 60 per cent of Trichomonas infections and 62 per cent of Giardia"]

The author has now tested, by way of preliminary to the use of carobinase in human cases of amoebic dysentery, dilutions of carobinase and their effect on cultures of *E. histolytica* at 37°C at pH 7.2-7.5. It was found to be amoebicidal in a strength of 1:4,000 and inhibited, but did not kill, at 1:5,000. It acted better, i.e., in higher dilution, in an alkalinized medium than in an acid, and it is advised that, if tried in man, alkalis should be given at the same time.

H. Harold Scott

CARINI, A. & REICHENOW, E. *Entamoeba caudata* n. sp. *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart [1949], v 1, No 1, 102-5, 8 figs

The authors describe a new intestinal amoeba recovered from the stool of a dog. The living parasite was observed in São Paulo, Brazil, by one of the authors, who supplied the other with preparations stained with iron haematoxylin, on which the present study is based.

When seen alive the amoeba was actively motile, its movements resembling those of *Entamoeba histolytica*. This motility was registered in the permanent preparations which show amoebae extended in length, with a finger-like pseudopodium, or rounded, with several blunt pseudopodia. The amoebae varied considerably in size, from 10 μ in diameter to 36 μ × 16 μ , the majority measuring from 20 to 26 μ .

The structure of the nucleus is typical of the genus *Entamoeba*, being vesicular, with a karyosome, which may be central or eccentric, and with coarse peripheral chromatin granules which are irregularly distributed on the nuclear membrane, usually in groups. The cytoplasm contains numerous ingested bacteria. The most characteristic feature of the new amoeba is the presence of a sac-like rounded protrusion situated at the end of the body opposite to the direction of locomotion, on account of which it is referred to as the "caudal appendage" (*Schwanzanhang*). This appendage, which appears to be a constant structure independent of the rest of the body, frequently contains masses of darkly staining granules representing bacteria in different stages of digestion. The authors regard this structure as a localized organ of digestion. Although blood and mucus were seen in the stool of the host, no cellular elements were present in the stained preparations. Cysts of this amoeba have not been seen. All the features described are shown in the text figures accompanying this paper. On account of the presence of a special "caudal" appendage with digestive functions, the amoeba in question is referred to a new species under the name

Entamoeba candida. The only other amoebae in which there is a differentiated portion at one end of the body are the free living *Trichamoeba* and the avian parasite, *Pygidium*.
C. A. How

GATTNER H. Die Flagellateninfektion des Darms. [Flagellate Infections of the Intestine.] *Med. Abh.* 1949 Apr 1 v 44 No 13 400-404 6 figs.

There are two schools of opinion regarding intestinal flagellate infection one looks upon them as harmless commensals the other as definitely pathogenic. The author belongs to the latter school. There is a third, or perhaps we should say an intermediate school which holds that some other lesion is primary and enables the protozoon under normal conditions harmless to become pathogenic. The author quotes cases in which a watery diarrhoea was the common symptom, with loss of weight and, in those of long standing symptoms leading to a suspicion of pellagra or sprue. One case is referred to of a man who suffered for a year from nocturnal enuresis and was found to have a *Trichomonas* infection when this was got rid of the enuresis also cleared up. The parasites found were *Giardia intestinalis*, *Trichomonas intestinalis* and in one this last together with *Chilomastix mesnili*. Under appropriate treatment the symptoms disappeared. Atebrin [mepacrine] 0.1-0.2 gm. daily was given for *Giardia* infection for *Chilomastix* and *Trichomonas* calomel for os and enemas of 5 per cent. argyrol were given. The author also gave emetine 0.05 gm. subcutaneously daily with success in *Giardia* and *Trichomonas* infections, and for the latter stavarsol, methylene blue 0.1 gm. t.d.s. or gentian violet 0.1-0.5 gm. [In none of the cases recorded is anything said of re-examination of the faeces after treatment to prove whether with the improved general condition and relief of symptoms, the parasites disappeared or not.] H. Harold Scott

HARRIS, R. H. & MITCHELL, J. H. Chronic Urticaria due to *Giardia lamblia*. *Arch. Dermat. & Syph.* 1949 Mar v 59 No. 5 587 9 1 fig.

A case is presented of chronic urticaria of five months duration with evidence of *Giardia* infestation which cleared after administration of quinacrine hydrochloride for a few days. A subsequent examination of the stool showed no evidence of *Giardia lamblia*. The accompanying symptoms of nausea, epigastric distress and alternate constipation and diarrhea ceased.

BYLMEER J. *Tricercomonas intestinalis* in the Netherlands. *Documenta Neerlandica et Indonensis de Morbis Tropici*. Amsterdam, 1949 Mar v 1 No. 1 71-4 1 fig.

In a survey of the population of Holland for intestinal protozoa the author detected the presence of *Tricercomonas intestinalis* (= *E. crounensis hominis*) in cultures of stools obtained from four persons. The culture medium consisted of liver infusion agar and diluted Loeffle serum with the addition of rice starch in which the flagellate grew at 37°C. Examination of fresh and stained (iron haematoxylin) smears revealed in the flagellate the typical structure. Four flagella (which three are directed forwards and one runs along the side of the body terminating in a free end posteriorly. In general the structure of the flagellate agreed with that described originally by Weyro and O'Connor except for the nucleus in which the chromatin (chromosome) was situated on the nuclear membrane. In discussing the nomenclature of the flagellate the author adopts the name *Tricercomonas intestinalis* in preference to *Entamoeba hominis* by which it is more generally known at present. Since in the present

cases the flagellates were not observed in the stools directly but were recovered in culture, it is thought that the actual incidence of infection with this species is higher than existing records would lead one to suppose C A Hoare

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

KRAKOWSKI, I & EDELSTEIN, A A Brief Survey of 25 Cases of Tick-borne Relapsing Fever, observed at No 9 Army Hospital Harefuah Jerusalem 1949, May 1, v 36, No 9 [In Hebrew 101-3 English summary 103]

"A benign disease caused by *Borrelia sogdianum*, a morphologically non-distinguishable strain of *Sp. obermeieri*. The cases were mostly of longer duration than is usually supposed, but of mild character and without any serious complications. The diagnosis was made by blood smears and 'thick drop' examinations. Contrary to the literature there was no leucocytosis and we observed at the time of the attack either a normal number of leucocytes or a relative leucopenia. An important diagnostic feature, which also could not be found in the classical or current literature is the high Blood Sedimentation Rate.

"Resistance of *B. sogdianum* to Salvarsan treatment.

"No active immunization because of probable different serological strains. There was no significant improvement or complete healing after penicillin treatment.

"No definite conclusions could be drawn concerning the prognostic value of the BSR.

"After surveying recent literature about local cases of relapsing fever and the occurrence of our cases, the conclusion might be drawn, that this disease is prevalent throughout the whole country."

BABUDIERI, B & BOCCIARELLI, D Electron-Microscope Studies on Relapsing Fever Spirochaetes *J Hygiene* 1948, Dec, v 46, No 4, 438-9, 10 figs on pl

This paper is a summary of observations, published by the authors in 1943 (*Rend Ist Sup. Sanità*, v 6, 305), on the morphology of relapsing fever spirochaetes as revealed by electron microscopy. One strain each of *Treponema recurrentis* and of *Trep. novyi* were used, the organisms being fixed in osmic acid vapour to avoid alterations during the repeated washings in the centrifuge.

Two forms of spirochaete were constantly present. One with both ends sharply pointed and a second with one pointed and one rounded end. During active reproduction the proportion of treponemes with both ends pointed rose sharply. It is suggested that the form with one rounded end is in the resting phase. Division takes place transversely by central thinning and results in one treponeme of each variety. If division is rapid, the rounded end does not develop, and subsequent divisions increase the sharp-ended forms still more.

The protoplasm appears to be homogeneous, but contains a few vacuoles and granules. No axial filament could be demonstrated. An undulating membrane, 0.05-0.1 μ in breadth, stretches the whole length of the spirochaete. If macerated, it forms fine fibres. In the rounded-end form, but never in the other, terminal flagella or a terminal filament were noted.

The authors consider that the presence of flagella and an undulating membrane bring the genus near to *Trypanosoma*.

[This should be compared with the paper on *Trep. vivax* by HAMPTON *et al.* (*Bulletin of Hygiene* 1949 v 24 444) the illustrations in which show many points of difference. There are 10 illustrations in the present paper]

J C Brown

DUBOIS A. Pluralité des souches de *Spirochaeta duttoni* dans une région limitée [The Plurality of Strains of *Spirochaeta duttoni* in a Limited Area.] *Ann. Soc. Belge de Méd. Trop.* 1949 Mar 31 v 29 No. 1 15-17

The author previously [this *Bulletin* 1931 v 28 735] showed that two strains of *Spirochaeta duttoni* isolated from different regions of the Congo, about 1 000 miles apart were immunologically distinct. The present note contains the results of a comparison of four strains of *S. duttoni* isolated from ticks and maintained in mice. Three strains came from one district of the Belgian Congo, Asirida, and one from Kigali only about 50 miles away. They were found to belong to two distinct types.

E H Mills

BLANC G. & MAURICE, A. Contribution à l'étude du spirochète de Goulamime (Maroc méridional). [A Contribution to the Study of the Goulamime Spirochaete (Southern Morocco).] *Arch. Inst. Pasteur à Maroc* 1949 v 3 No. 10 813-15.

Numerous ticks *Ornithodoros erraticus* were collected from the burrows of rodents in the region of Goulamime Southern Morocco and found to be infected with the spirochaete first recorded from this region by BALTAZARD [this *Bulletin* 1938, v 35 497]. The authors succeeded in producing infections in white mice and the Barbary ape (*Macaca sylvana*) and also found the spirochaete in the blood of the rodent living in the burrow, *Sitomys shawi*. Mice were found to be very susceptible and showed a heavy infection lasting in the blood up to 15 days. The Barbary apes were found to be much less susceptible to this strain than to the house-transmitted relapsing fever. Five inoculated with blood containing spirochaetes showed rare organisms in the circulation but no febrile symptoms and one bitten by infected ticks showed no signs of infection. Attempts to infect six human subjects in various ways gave negative results.

The authors provisionally suggest the name of *Spirochaeta (Berrelia) mercurialis* for this organism.

E H Mills

BALTAZARD M. KYDIAN B. MORIDI C. & BARHAYAR, M. Données expérimentales nouvelles sur la fièvre récurrente épidémique humaine [New Experimental Observations on the Epidemic of Human Relapsing Fever] *Bull. Acad. Nat. Méd.* 1949 v 133 Nos. 13-14 284-9 2 figs.

The authors summarize some of the information concerning the great pandemic of relapsing fever which started during the recent war and which, after lasting for more than five years, now seems to have died out. Fifteen different strains of the spirochaete have been isolated and studied in newly born rabbits this *Bulletin* 1947 v 44 805. Eleven were only maintained long enough for their identification, three were kept for some time in rabbits and lice and then abandoned, and only one strain isolated 31st May 1947 is still being maintained (29th March 1949).

This strain R 2 XVIII after 114 passages shows no alteration in its characters. The pathogenicity remains as low for experimental animals but it is still very virulent to man as shown by two accidental infections in the laboratory. It has also been used in the parent therapy of 23 cases of general paralysis for which it is very suitable. It is very susceptible to chemical treatment.

Very numerous experiments have been made on the louse transmission of the disease with the use of four different strains. The incubation period in man was found to range from 3 to 7 days, depending on the inoculum. Each strain was found to be antigenically distinct, and recovery from any strain, although conferring immunity against the same strain, did not give any protection against the other strains. The relapse spirochaetes were found to be identical with those of the primary attack.

Evidence is produced in support of the view that there is a seasonal cycle in the virulence of this infection in man. During autumn the virulence diminished and in winter completely disappeared, although in young rabbits and lice the virulence remained unchanged. In April, however, the strain was found to have recovered its full virulence which was maintained until the next autumn when the same diminution and disappearance of infectivity to man was repeated.

Concerning evolution in the louse, the authors find that at 32°C spirochaetes, as such, disappear in 24 to 36 hours, on the sixth, seventh and eighth days, short forms begin to appear, and become more abundant in the following days. During the negative phase the contents of the lice were still virulent. Lice were found to retain their infectivity as long as they lived, a maximum of 23 days in this series of experiments. The percentage of lice becoming infected after feeding on blood containing spirochaetes seemed to depend on the intensity of the infection, and similarly the intensity of infection depends on the number of spirochaetes in the louse. All the negative results were considered to be due to the ingestion of too few spirochaetes, and the authors were unable to infect any lice by feeding them on human cases in the autumn when the virulence was diminishing.

E Hindle

- 1 BALTEANU, I, RUSS, M & VOICULESCU, M. Les propriétés spirochétolytiques du sérum de convalescent de fièvre récurrente [Lytic Properties on Spirochaetes of Convalescent Serum from Cases of Relapsing Fever] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2, 310-12
- 11 —, VOICULESCU, M & RUSS, M. L'action thérapeutique du sérum de convalescent dans la fièvre récurrente [Therapeutic Action of Convalescent Serum in Relapsing Fever] *Ibid*, 312-15

1 In louse-borne relapsing fever, antibodies appear and reach their maximum titre during convalescence. Serum from such cases, when mixed with complement and added to a suspension of spirochaetes, causes granular fragmentation and eventually disappearance of the spirochaetes *in vitro*.

During an epidemic of the disease in Bucharest in 1946, convalescent serum was used in treatment [see below]. This note records a study of the action of the serum *in vivo*.

The authors were struck by the strong and rapid reaction ($\frac{1}{2}$ to $\frac{1}{4}$ hr) which followed the intravenous administration of convalescent serum to patients during an actual attack. The violent rigor, hyperpyrexia, and aggravation of symptoms—even actual collapse—were followed by quick defervescence and cure in three-quarters of the cases. When intravenous therapy was replaced by intramuscular the reaction was fairly light and resembled normal defervescence. The spirochaetes disappeared from the blood in 3 to 12 hours.

The authors believed that this *in vivo* result corresponded to the *in vitro* destruction of spirochaetes, and was attributable to the presence of products of protein breakdown. They liken the reaction to a rather violent Herxheimer reaction.

Experiments showed that no such reaction followed the intravenous inoculation of (1) relapsing fever convalescent serum into two patients with other acute fevers, (2) normal serum in patients during an attack of relapsing fever (3) convalescent serum in three patients during the afebrile stage of relapsing fever.

They therefore conclude that (1) The therapeutic action of the convalescent serum is specific and due to its "spirochaetolytic" properties, (2) it only occurs when the serum is given during the febrile period, when the patient's blood is rich in spirochaetes.

ii. During the great epidemic of house-borne relapsing fever in North Africa in 1914-45 [this *Bulletin* 1946 v. 43 829] convalescent serum was used in treatment with favourable results by a number of workers e.g. HOFFMANN and WEICHRODT and BEXILAMON (but no references are given).

The present authors treated 30 patients in this way in Bucharest between January and July 1946. They give examples of conditions when such treatment is specially indicated e.g. when arsenical treatment is contra-indicated, not available or ineffective. It is noted that 75 per cent of relapses followed treatment by salvarsan of Rumanian prisoners having nutritional deficiency.

The serum has the advantage of being free from "toxicity" properly so-called (but see above). It can also correct the hypoproteinaemia often seen in relapsing fever and it is readily obtained on the spot during an epidemic.

The serum was obtained from patients with no previous treatment, from the seventh day of apyrexia after the third febrile attack. 1 general sera were chosen having a minimum spirochaetolytic titre of 1/1 000. After bacteriological control, pooled sera from several convalescents were kept in the refrigerator.

After the severe reactions first encountered in intravenous therapy this was abandoned in favour of the intramuscular route. The total dose varied from 50 to 120 cc., being in general 1 cc. per kilo of body weight. Doses exceeding 50 cc. were given in two injections at an interval of two days.

The first 10 patients served to establish the most suitable form of technique. Of the other 20 15 were inoculated during the first attack. 14 of these were cured and only 3 had second attacks. Among 24 untreated controls only 8.3 per cent. had another single febrile attack, 41 per cent. had two attacks, 41 per cent. had three and 7 per cent. had four.

In those patients treated with serum the duration of the first attack was 5.65 days, compared with 5.92 to 6.83 days in the controls. It was clear that the treatment arrested the development of the disease which in four fifths of the cases showed only one relapse of reduced duration.

Therapeutic efficacy was directly proportionate to the quantity of serum given. The best results were obtained with the use of 80-120 cc. given in two injections at intervals of 4 hours. This resulted in cure in all 18 patients while only 4 out of the other 7 were benefited by doses of 50-65 cc.

It is stated that the best time for starting treatment is during the first febrile attack.

H. J. O'D. Hurk Gaffrey

See also p. 675 THOMPSON DE MEILLON & HARDY. The Effect of 2, 3-Dimercaptopropanol (British Anti-Lewisite) on the Toxicity of Neocarysthenamine for *Ornithodoros moubata*.

YAWS

COSTHUIZEN, S F Yaws. *Brit J Radiol* 1949, May, v 22, No 257, 276-9, 7 figs

Bone lesions occur in the tertiary stage of yaws, the secondary skin lesions of which usually occur in childhood. Bones are affected in the following order of frequency: tibia, inner end of clavicle, upper limbs, hands, feet and skull. It is uncertain if the vertebral column is affected, but the author refers to cases in which this might have happened. The periostitis and osteitis of yaws resemble those of syphilis. Pain is prominent in the lesions of the long bones, but not in those of the skull, in which swelling is the chief complaint and in which pressure symptoms may occur. Although symptoms are rapidly relieved by arsenical or bismuth therapy, "these drugs provide no cure, they merely give temporary relief."

The author describes (1) periosteal changes producing "onion-peel" or lace-work patterns and the production of sabre tibia, (2) erosion of cortex, usually multiple and with well-defined margins, (3) cyst-like changes, especially in the skull, (4) sclerosis often related to (1) and (2), (5) sequestrum formation, particularly in hands and feet, (6) changes in contour of bones. Joints are not usually involved. Differentiation from syphilitic bone lesions may be very difficult.

[There is no indication of the country of origin of the lesions described, clinical or serological data upon which diagnosis was based, or the number of cases upon which the author's generalizations are based. One would like to know his reason for the conclusion that the effects of arsenical and bismuth therapy are merely palliative. No reference is made to secondary bone lesions, especially in children, which are probably more frequent in many parts of Africa than tertiary bone lesions in adults. There are no references to any publication on the bone lesions of yaws. see this *Bulletin*, 1946, v 43, 1091.]

C J Hackett

FRIEDHEIM, E A H A Five Day Peroral Treatment of Yaws with STB, a New Trivalent Arsenical *Amer J Trop Med* 1949, Mar v 29, No 2, 185-8

The author discusses the essential characters of the ideal drug for the treatment of yaws in rural populations. They are, wide safety margin, ease of administration, short course of treatment, stability under tropical conditions and low cost. "We have now prepared a relatively non-toxic and stable form of 4-oxy-3-acetylaminophenylarsenoxide, i.e., the trivalent derivative of acetarsone [acetarsol], and find that this compound, designated 'STB' approaches closely the characteristics set forth as being desirable for mass treatment in undeveloped territories."

Clinical tests were made in mountainous forest regions of Gueckedou, French Guinea, in 88 cases of secondary yaws. The daily dose used was "0.01-0.02 gr" [presumably gramme] per kgm body weight by mouth in single doses on five consecutive days. No signs of intolerance were observed. Patients were observed for three months, when 87 of the 88 patients were regarded as cured [presumably on clinical evidence only as no serological data are reported].

[A number of statements are made, such as "Tartar emetic has had to be banned altogether from use in the Kissi tribe of Sierra Leone, where even greatly reduced doses caused death," for which no authority is given by the author or known by the reviewer.]

C J Hackett

LEPROSY

CANIZAROS O. New Official Classification of Leprosy. *Arch. Dermal. & Syph.* 1949 May v 59 No. 5 584-8

The author discusses the findings of the 5th International Congress for Leprosy held in Havana, Cuba, in April 1948 (this *Bulletin* 1949 v 48 52) with special reference to the superiority of sulphones in treatment and to the new classification which will supersede the Cairo classification.

As the recommendations of the Classification Committee of the Congress have not yet been published in detail in this *Bulletin* the relevant text of their Report is reproduced here in full —

The Classification Committee of this Congress in a serious attempt to reconcile and unify these apparently discordant systems has arrived at a formula which is believed to be based on a biologic interpretation of the clinical facts. The criteria on the basis of which the three classes herein defined are established are in diminishing order of availability: (1) clinical, (2) bacteriological, (3) immunological, and (4) histopathological.

It is proposed that the classical division of leprosy into two types, polar (Raballo 1938) in their essential characteristics and relatively stable in their evolution, be recognized and maintained and that they be designated:

"*Lepromatous* (malignant or gravis) symbol L.

"*Tuberculoid* (benign, or mitis) symbol T.

It is also proposed that in addition recognition be given a group of cases of less distinctive or positive characteristics less stable and less certain with respect to evolution, and that it be designated *Indeterminate* (undifferentiated) symbol I.

Definitions

The characteristics of these three classes of leprosy are as follows —

"*Lepromatous type*: Minimal resistance to the existence, multiplication and dissemination of the bacilli; constant presence of large numbers of bacilli in the lesions with a distinctive tendency to form globi; characteristic clinical manifestations in the skin, mucous membranes (especially of the upper respiratory tract and eye) and of the peripheral nerves, together with involvement of other organs; regular failure to react to lepromin; pathognomonic granulomatous structure of the lesions; marked stability of type and tendency to progression. These cases are infectious or open.

"*Tuberculoid type*: High resistance to the existence, multiplication and dissemination of the bacilli; bacteriologically negative as a rule or if positive with few bacilli except in reactional states; characteristic clinical manifestations mainly in the skin and nerves, tending to be limited in extent and varying in degree with the reactivity of the tissue; reactivity to lepromin in very high percentage of cases; nearly always a tuberculoid granulomatous structure in active lesions; marked stability and a strong tendency to spontaneous regression in the absence of repeated reactions. These cases are usually non-infectious or closed.

"*Indeterminate group*: Variable with respect to resistance, clinical manifestations chiefly in the skin and nerves; the skin lesions usually flat macules either hypochromic, erythematous-hypochromic or erythematous; bacteriologically negative as a rule or if positive with few bacilli; lepromin reaction usually negative or moderately positive; the lesions histologically of simple inflammatory nature; stability much less than in either of the polar types and variable tendency with regard to persistence, progression or regression or transformation into one of the polar types. These cases are usually non-infectious.

" Clinical Subdivision of Cases

" The fundamental aim of any classification of a leprosy case being the determination of the type or group to which it belongs, in accordance with the foregoing definitions, certain members of the Classification Committee held that the 'subtypes' of other systems merely correspond to clinical aspects of variable importance. These aspects can be considered from different points of view, namely —

" *Degree of severity* (as, for example, the I_1 , L_2 , L_3 , of the Memorial Conference classification),

" *Manner of evolution* (slow or rapid, stationary or progressive, reactionary states, etc.),

" *Localization* (skin, nerve, eye, systemic, etc.),

" *Morphology* (macules, nodules, 'plaques', diffuse infiltrations, etc.),

" *Clinical form* (classical nodular lepromatous, diffuse lepromatosis of Lucio, etc.)"

H J O'D Burke-Gaffney

QUEENSLAND ANNUAL REPORT ON THE HEALTH AND MEDICAL SERVICES
OF THE STATE OF QUEENSLAND FOR THE YEAR 1947-48 pp 7-8 Leprosy
[REYE, E J & MAHONY, F]

In Queensland there were 52 white patients with leprosy on Peel Island at the end of June, 1948 of whom 42 were males. The average age was 47 years and there were six over 70. There were three deaths from intercurrent disease. All patients co-operating received sulphone therapy. It is stated that prominin therapy was 'highly satisfactory in view of the fact that a number of cases receiving it were in a very serious condition and that at the end of twelve months all were out of danger'. Nevertheless the use of this drug was abandoned in view of the time required for its administration. Fourteen patients completed the full year's treatment and 12 others received 6 months' treatment each.

The administration of diasone was easier, as it is given by the mouth. It was given to those not on prominin in November, 1947, and to those who had been on prominin for a full year. The results have "so far been quite satisfactory". No transfusions were necessary, any anaemia occurring being amenable to ordinary measures. There was one case of severe granulopenia which responded to pentosenucleotide, penicillin and liver extract.

Diasone treatment was continued by discharged patients under the supervision of their own doctors. It is hoped eventually that this treatment will be available for most of those patients on parole and for those in the non-infectious stages.

No surveys among aboriginals were possible, but there was "a number of admissions to Fantome Island during the year" among cases suspected in the last survey.

The difficulties of diagnosis, and the shorter periods of contact and incubation in aboriginals are discussed and the need for thorough and extended examination of known contacts is stressed. "The present state of the disease in Queensland remains virtually unknown".

Great improvements in the general amenities at Peel Island are recorded, especially as regards conversion of Army huts into additional accommodation and the introduction of an electric light plant and cinema equipment.

H J O'D Burke-Gaffney

OTRIZA, A., GONZALEZ PRENDES, M. A. & IBARRA PEREZ, R. Estado actual de la lepra en Cuba. [Present State of Leprosy in Cuba.] *Rev. Sifilografía, Leptología y Dermatología*. Marianao Cuba 1945 July Dec., v 5 No. 3 283-9

A paper read at the recent Fifth International Congress on Leprosy telling of the researches of the Society for the Prevention of Syphilis, Leprosy and Diseases of the Skin (P.S.L.E.C.) This body has established dispensaries in different parts of the island, each with its medical director who has specialized in venereal and skin diseases a medical staff nurses and laboratory technicians. The larger dispensaries have dentists also. All treatment is free and nurses visit the homes of patients, examine contacts and use persuasion to get them to attend at the dispensary. If patients cease to attend, notice is sent to them and, if that is not enough they are visited personally. The School Hygiene Department reports through the Minister of Education to the P.S.L.E.C. any children suspected of leprosy.

In Cuba, with a population of 4,778,583, there are 3,001 leprosy patients (62.8 per 100,000) of whom 2,358 are ambulatory (79.5 per cent.) and 643 are in hospital. 878 are in Oriente Province, 528 in Havana, 443 in Las Villas, 303 in Camagüey, 148 in Matanzas and 62 in Pinar del Río. 1,275 are males, 1,013 are females, the sex of 70 is not recorded. 1,122 are of the lepromatous type, 457 unspecified, 374 tuberculoid and 408 not known (or not recorded). As regards race, 1,618 are white, 414 are half-castes, 299 blacks, 12 yellow and 18 are not known. [See also this *Bullet.* 1946, v 43, 563, 603.]

II Harold Seed

ANGEL IBARRA D. Técnicas de coloración del *Mycobacterium leprae* [Methods of Staining *Mycobacterium leprae*] *Rev. Fontilles* Valencia 1949 Jan., v 2, No. 3 231-6.

This paper comprises four sections: 1. General staining of the organism. 2. Staining of the Lutz granules. 3. Difference of staining of living and of dead organisms. 4. Differential staining from *Mycobacterium tuberculosis*.

Nine methods are included under the first, but the one recommended is that of v. Halleberg—

I. Stock solution

Propionate of sodium (or potassium acetate)	1 gm.
Alcohol, 90 per cent.	100 cc.
Night Blue	5 gm.
Bismarck Brown	0.4 gm.

For use 10 cc. of this is mixed with 90 cc. distilled water. The stain is added to the slide, heated to boiling, allowed to cool for 5 minutes, washed with distilled water, decolorized with the following till no more stain comes away:

Nitric acid, 23 per cent.	4 cc.
Alcohol, 70 per cent.	100 cc.

Leave to dry. The bacilli appear blue on a dark background.

Under the second, staining of granules, again several methods are mentioned but all are modifications of Mucha's method except Spengler & Siebel's rapid method. Fix by heat, stain by warming for 2-3 minutes in a mixture of fuchsin 3 parts, gentian violet 2 parts, pour off and without washing add saturated picric alcohol for one minute, wash with alcohol 60 per cent, decolorize with dilute acetic acid (1 in 6) and afterwards with alcohol 60 per cent. Stain with saturated picric alcohol (or trypan blue) for one minute. On a yellow background the bacilli appear rose-red, and the granulations a dark violet almost black.

For the third, the Aoki erythrosin and methylene blue method is recommended. After fixing by heat, the slide is covered with the following for 5 minutes, the stain being used hot (at 80°C)

Erythrosin	1 gm
Picric acid	0.15 gm
Distilled water	100 cc

Place the specimen in a solution of potash (KOH 5 gm, alcohol absolute 30 gm., aq. dest. 70 cc) for one minute, then wash and stain with

Saturated alcoholic solution of methylene blue	15 gm
Distilled water	100 cc

Living organisms are coloured bright red and the dead or nearly dead are dark blue to violet

Lastly, for differentiating from *Myco tuberculosis*, Yamamoto's method is recommended. Place in hot silver nitrate, 5 per cent at 55-60° for 10 minutes and then in the following

Tannin	1 gm
Pyrogalllic acid	2 gm
Distilled water	100 cc

for 5 minutes, wash and dry

Tubercle bacilli are stained black, *Myco leprae* do not stain, but can be stained by Ziehl's method for greater certainty

H Harold Scott

MIGUEL, S & MIRÓ, J. El corazón en la lepra [The Heart in Leprosy] *Rev Fontilles* Valencia 1949, Jan, v 2, No 3, 202-26, 8 figs [20 refs]

The English summary appended to the paper is as follows —

"The authors study 38 cases of leprosy of the Colony-Sanatorium of Fontilles, examining the heart in order to know the participation of this organ in leprosy. Five pathologic cases are referred all of them myocarditis, in which one suspects the leprosy as an etiological factor"

SCHUJMAN, S. Es menos activo el aceite de chaulmoogra y sus derivados que las sulfonas en el tratamiento de la lepra? [Is Chaulmoogra Oil and its Derivatives less Active than Sulphones in the Treatment of Leprosy?] *Prensa Méd Argentina* 1948, Dec 31, v 35, No 53, 2499-2508, 14 figs [11 refs] English summary

There are physicians who cling to chaulmoogra and regard it or its derivatives as the only efficacious form of treatment in leprosy. Others, having obtained good results with promin, go to the other extreme and say that, compared with promin, chaulmoogra is useless. Others again, after trying chaulmoogra, get better results with promin.

In this short paper the author tells of his experience with each of these drugs and reproduces photographs showing the results in patients with tuberculous and nodular leprosy and with the macular form. These photographs seem to show that equally good results follow the use of either and the author concludes, after having treated 80 patients with the lepromatous form, that injection of 20-30 cc of chaulmoogra weekly for two years gives as good results as treatment with promin, but it is essential that adequate doses should be given over a sufficiently long period, secondly, still greater benefit may be obtained in some cases by a combination of both drugs, used alternately. His illustrations, both of patients and of the tissue changes brought about, would appear to confirm this, namely that the results are equally good.

H Harold Scott

CROVER MADAMAWY P. La tracheotomie y las sulfonas en la lepra [Tracheotomy and Sulphonas in Leprosy] *Rev. "Fouilles"* Valencia, 1949 Jan., v. 2, No. 3, 227-30.

Tracheotomy is not often called for in leprosy and then mostly as an emergency to prevent suffocation from laryngeal blocking. In ten years, among 500 patients with leprosy, 12 have undergone this operation, 8 women and 4 men. Of these 9 have died, 1 within 48 hours it was thought from some intercurrent infection, 3 at the end of one year, 3 after two years, 1 at three and one at four years—the remaining 3 have a tracheal cannula. 1 five years later, 1 two years and 1 seventeen months after operation. If care were taken to keep the nostrils clear, tracheotomy would be even less often called for.

Promin is regarded by the author as almost specific for leprosy laryngitis and it should be prescribed when hoarseness is a symptom of the disease. In fact, he sums up his opinion in these words (translated): "Promin is for leprosy laryngitis what streptomycin is for tuberculous laryngitis." [No details are given as to dosage.] H. Harold Scott

HELMINTHIASIS

LAFFENTZ, M. Les parasites intestinaux au Gabon. Résultats d'une enquête dans la région de l'estuaire. [Investigation of Intestinal Parasites in the Gabon Estuary Region.] *Indo Soc. Path. East* 1948, v. 41, No. 8, 10, 538-91.

The author carried out a parasitological examination among African laborers and their families in an equatorial forest area in the estuary of the Gabon, 50 kilometres SE. of Libreville. A specimen of faeces was examined on slide by the direct method, without concentration.

Of 525 persons, 452 (86 per cent.) were found to be infected. The parasites found were *Ascaris* (290), Hookworms (243), *Trichuris* (174), pathogenic amoebic cysts (11), *Strongyloides* (5) and *Trichomonas* (3). The infection was multiple in half the cases, including a treble infection in 36.

The author is convinced that much mortality and morbidity among children and infants can be ascribed to parasitic infections. L. E. Nafar

SANDOWAN, A. A. Some Parasitological Facts of Significance to the Clinician in Malaya. *Proc. Alim. & A. Soc. F. M. S. Ed.* 111 College / Med. Singapore 1948, Oct., v. 1, No. 1, 45-5.

General observations without references.

FERRERA, I. S. C. As parasitoses intestinais na Guiné Portuguesa. (Human) Intestinal Parasitosis in Portuguese Guinea. *Gaz. 3122* Portuguese 1949 v. 2, No. 1, 148-5.

Among 2,440 persons presenting themselves for treatment at the Institut of Tropical Medicine in Portuguese Guinea, 908 had faecal examinations made direct or by the Willis-Tekmann-Lima or Faust method. Two hundred and ninety-four (48 per cent.) contained parasites of one kind or another, 251 had single infections, 224 worms only, 22 protozoa only and 43 had multiple infection. Of the helminthic infections, hookworm (176, 79.5 per cent.) was the most common, with *Isospora* *serenata* 23 (11), next *Isospora* and *Trichuris*; cases were few only 6 each *Enterobius* 5 and *Isospora* 4, *Isospora* 4.

Of the 27 protozoal cases, 23 were *Entamoeba coli*, 2 were *E. histolytica* and 2, *Giardia intestinalis*. Taking all into consideration, single and mixed, helminthic and protozoal, ankylostomes were found in 63.2 per cent, *E. coli* in 12.9, *T. saginata* in 7.9, *Trichuris trichiura*, 4.1, *E. histolytica*, 3.5, *Ascaris lumbricoides*, 2, the others in very small numbers only.

The symptoms are mentioned and consisted mainly of abdominal discomfort, diarrhoea and, in dysenteric patients, tenesmus, but many had no subjective complaints at all and the infection was found by chance when the faeces were examined.

H. Harold Scott

SHOUSHA, A. T. **Schistosomiasis (Bilharziasis) a World Problem** *Bull. World Health Organization* Geneva 1949, Mar., v. 2, No. 1, 19-30 [17 refs.]

Sir Aly Tewfik Shousha divides his paper into several sections, dealing respectively with the history of schistosomiasis, life cycle of the parasites, distribution and importance of the disease, treatment and prevention in Egypt. The three first sections are very brief, and the section on treatment refers mainly to the use of tartar emetic (the potassium salt) in Egypt. Here he shows that whereas in 1925 the surgical complications of schistosomiasis were relatively common (50.7 per 10,000), they were much more rare (2 per 10,000) in 1933, this reduction is ascribed to the effect of drug treatment on a large scale. Both *S. haematobium* and *S. mansoni* infections are involved.

The author estimates that in Egypt some 10,000,000 people suffer from these infections, and he notes that the unpleasant effects of tartar emetic are such that many patients prefer the chronic disease to the treatment, and therefore refuse to accept or finish it. "It is hopeless to try to eradicate the disease by treatment," partly because reinfection is almost inevitable. "Control of the disease by prevention of pollution and by propaganda is equally hopeless." Control by eradication of snails is possible in Egypt, where the water system of the whole country is more amenable to supervision than in most other regions. The means in use include clearance of vegetation from canals, drains and ponds, drying (which is not effective as the snails survive the 40 days of winter closure of canals), canal alternation, underground irrigation or drainage (very expensive), the use of poisons (copper sulphate is most commonly used) and of traps.

Charles Wilcocks

PIPKIN, A. C. & RIZK, E. **Vesical Schistosomiasis in the Middle East with a Report of Two New Foci in Northern Syria** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 276-84, 1 fig. [11 refs.]

After a study of the limited literature on the prevalence of schistosomiasis in Syria, schistosomiasis surveys were undertaken of the Northern and North-Eastern parts of the country. Two foci of endemicity of *Schistosoma haematobium* were disclosed: these were some 150 miles apart and sited on tributaries of the upper Euphrates river on the Turkish border of Northern Syria. In one of these (Koubour El Bid) 337 of 545 persons of all ages and both sexes examined in 19 villages were found, on a single examination, to be passing viable eggs of the worm in the urine. This high infestation rate (61.8 ± 2.2 per cent) is comparable to that among the Egyptian fellahs and for the lower Euphrates-Tigris focus in Mesopotamia, and higher than that recorded for the Palestinian focus. In spite of this high figure reasons are advanced for considering the disease to be localized to the area. While shells of a *Bulinus* sp. (probably *truncatus*) were found, no snails infected with the human schistosomes were recovered. In the other area surveyed (Tel-Abiad) persons from only five villages were examined, but nearly 100 per cent of the males and 60 per cent

of females were found infected. In view of the nomadic habits of the local Bedouins in this second area, further extension of the infection is likely to take place in this locality.

A. R. D. Adam

WATSON J. M. & ALI AL HAMAMI. Studies on Bilharziasis in Iraq. Part II. Incidence in the City of Baghdad. An Analysis of over a Thousand Random Urine Samples with reference to Age and Locality. *J. Faculty of Med., Baghdad Iraq* 1949 Jan. v 13 No. 1 49-62, 1 plan. [11 refs.]

Schistosoma haematobium infection has long been endemic in Baghdad, but the exact incidence has not hitherto been systematically investigated. The authors took specimens of urine at random from out patients attending the Endemic Diseases Department of the Royal Hospital. Very few of their subjects were at the hospital directly because of this infection and they make the point that as in other places where it is endemic the early symptoms (haematuria and pain on micturition) are not regarded seriously by the patients. In all they examined 887 males and 491 females the incidence rates being 7 and 14 per cent, respectively. Incidence varied from 15 to 22 per cent, in the decades up to age 50 at ages over 50 it was only 4 per cent.

The authors discuss these findings, emphasizing the fact that little or no immunity is conferred by the infection and that in Baghdad it is by no means a disease chiefly affecting children. Males are more commonly affected than females because they work in infested irrigation water and bathe in it whereas women are chiefly exposed when washing clothes and the disturbance they create in the water even if soap is not used, is surely a deterrent to the cercariae.

There was little difference in the distribution of infection in people living on the east bank of the river compared with those of the west bank, and the incidence in the different zones was fairly constant. *Bilharzia* has previously been found in canals in the city and it was known that many of the patients examined had never been outside Baghdad it appears certain, therefore that the disease is transmitted in the city.

[For Part I of this series see this Bulletin 1949 v 48 534.]

Charles H. Deeks

GELFAND M. & ROSS W. F. The Incidence of Schistosomiasis in South Central Africa. *Trans Roy Soc Trop Med & Hyg* 1949 May v 42, No. 6, 559-64.

The incidence of schistosomiasis in sundry parts of Africa has been determined by various workers on the basis of microscopical examination of stools and urine. This method is open to criticism, especially if only one or very few specimens are examined from each person. The collection of rectal and bladder biopsy specimen is impracticable for survey purposes and the technique though good, is not an infallible diagnostic procedure. Similarly the collection of material from the rectum by digital scraping, or by a W. Her scraper is unsuitable for large-scale investigation.

Routine digestion, in 10 per cent. potassium hydroxide for 4 hours at 37°C of the entire rectum and bladder of all patient coming to autopsy and examination of the deposit for schistosome ova affords the most accurate means of determining the infestation rates within the urinary and rectal schistosomes in population. Disadvantages are the time that must lapse before sufficient large series of cases can be accumulated, the need for trained staff and special facilities, and the doubt that remains as to the degree of activity of the infection when disclosed by this means. Organs from 115 male and 35 female Africans from Northern and Southern Rhodesia from Nyasaland and from Ioropoese

East and Portuguese West Africa, were examined in this manner, from 147 (98 per cent) of these 150 cases schistosome ova were recovered. There is thus a high incidence of schistosomiasis in this wide area of South Central Africa, and the infestation rate revealed by this technique is far in excess of those previously published but based on the examination of the living. As a negative finding does not warrant the assumption that infestation is absent, it is probable that every African from this part of Africa has or has had schistosomiasis. One hundred and forty-six (99.3 per cent) of these 147 infected persons harboured *S. haematobium*, 72 (48.9 per cent) *S. mansoni*, and 71 (48.3 per cent.) both parasites. In only one single case was a pure *S. mansoni* infestation identified. *S. haematobium* ova were recovered from the bladder at 134, and from the rectum at 112 autopsies, from the bladder but not from the rectum in 22 cases, and from the rectum but not the bladder in 8. *S. mansoni* ova were recovered from the rectum at 67 autopsies, from the rectum and bladder at 5, from the rectum but not the bladder at 62, and from the bladder but not the rectum at 3.

Examination of small snips from the rectal and from the bladder mucosae showed the presence of ova in 117 of the 134 proven cases of bladder infestation (86 per cent), and 107 of the 137 proven cases of rectal infestation (78 per cent). Ninety-two cases of 134 (68.6 per cent) with bladder snips containing *S. haematobium* ova also had these ova in rectal snips. A R D Adams

MEIRA, J. A. *Schistosomiasis mansoni: a Survey of its Distribution in Brazil*. Bull. World Health Organization, Geneva, 1949, Mar., v. 2, No. 1, 31-7, 1 fig (map) [14 refs]

This paper includes a useful map which shows that infection with *Schistosoma mansoni* is very common along the coast of Brazil from the Ceará province in the north to Rio Grande do Sul in the south. Foci are also found well inland, especially in the provinces of Pernambuco, Bahia and Minas Gerais. A list of infected localities is also given: there are 364 such localities, and there are probably nearly 3 million persons (in a population of 45 millions) suffering from the infection. Charles Wilcocks

TIDY, H. *Ayerza's Disease, Silicosis, and Pulmonary Bilharziasis*. Brit. Med. J. 1949, June 4, 977-8 [11 refs] [Summary appears also in Bulletin of Hygiene]

In Ayerza's disease in Brazil, as first fully described in a monograph by ARRILLAGA of Buenos Aires in 1913, the predominant pathological change is sclerosis of the pulmonary artery and its branches, with the associated lung changes. Arrillaga's subjects were adults, and clinically cyanosis was an outstanding feature of the syndrome. Since Arrillaga's publication small numbers of isolated cases of Ayerza's disease have been recorded from all parts of the world, these have been of all ages and in few of them was the aetiology clear.

In 1928, SOROUR (C. R. Congr. Int. Méd. Trop. Hyg. Cairo, 1932, v. 4, 321) gave a fresh account of the pathology, and AZMI and EFFAT of the clinical picture [this Bulletin, 1932, v. 29, 411], of cases of Ayerza's syndrome diagnosed in Egypt. Others in Egypt have since studied the clinical picture and pathology of the condition as seen there, and it is now possible to diagnose it in its early stages, and it is increasingly being detected. The initial lesion in Egypt is an obliterative endarteritis of the small branches of the pulmonary artery, due to schistosome ova [spp. not stated] reaching the region embolically; this, with reinfection, extends to the main branches of the artery which may become aneurysmal and cor pulmonale develops, the lung parenchyma remains

uninvolved. While the hypertrophied right ventricle succeeds in forcing sufficient blood through the obstruction there is no cyanosis when it fails to do so cyanosis appears. The Egyptian cases differ from the Brazilian in that cyanosis is not marked in the former and the pulmonary symptoms are mild.

There are thus two distinct regions where pulmonary arterial sclerosis is known to be relatively common, Brazil and Egypt. In Brazil gold mining at an altitude of 14 000 feet is the local industry—silicosis may be the primary aetiological factor and the great altitude may cause the severe cyanosis characteristic of the condition in this area. Removal to a lower altitude has been shown to diminish the cyanosis in these cases. Pulmonary bilharziasis does not seem to have been reported from Brazil, where *Bilharzia mansoni* is the prevalent schistosome. In Egypt schistosomiasis is the primary aetiological factor and cyanosis is not a feature of the syndrome until terminally when the heart fails. Nevertheless, in Brazil also the possibility of pulmonary schistosomiasis as a main or contributory factor in Ayerza's disease should be borne in mind.

A. R. D. Allen

BLAIR, D. M., HAWKING, F., MEYER, C. V. & ROSS, W. F. Miracil. Clinical Trial on Patients Infected with *Schistosoma haematolum* and *S. mansoni*. *Brit. J. Pharmacol. & Chemotherapy* 1949 Mar. v. 4 No. 1 68-70 [13 refs.]

The thioxanthone Miracil D synthesised in Germany was found by JUKKE & GÖNERT (this Bulletin 1949 v. 46 481) to be active against experimental infections with *S. mansoni* in mice and monkeys. WARSON *et al.* used the drug in treatment of schistosome infections in Egypt (ibid. 1949 v. 45 1018) and BLAIR *et al.* have given a preliminary report of their findings in *S. Rhodesi* (ibid., 1949 v. 45 529). The drug is best given by mouth as subcutaneous or intramuscular infection causes irritation. Most patients in the present trials were young Africans with active infections. After clinical examination, the drug was administered usually as 100 mgm. tablets by mouth and at intervals examinations of urine or faeces were made for eggs or miracidia. In one series 44 young persons, some with double infections of *S. haematolum* and *S. mansoni* were treated with daily doses of 0.1 to 0.7 gm. of Miracil D on 6 days per week over a period of 3 weeks. The follow-up was made at weekly intervals over a period of 16 weeks or longer. After 1 week, 11 patients with *S. haematolum* infection and 1 with *S. mansoni* appeared to have been cured. The infections in these cases were originally light and those with double infection were sometimes freed from one species of parasite only. In a second series of 13 boy patients the dose of drug was increased to 0.6 gm. daily and was given on 17 occasions. The total dose was 35 to 150 mgm. per kid. After 4 months four of them appeared to be cured. When 18 boys 1 to 14 years infected with *S. haematolum* were given doses 1.0 to 0.7 gm. of Miracil D daily over a period of 10 days 12 of their number were not passed in all eggs at the end of 15 weeks. Some of 11 patients in hospital were given much as 1.8 gm. daily for a period of 8 days. Results in these cases were favourable.

The description of treatment which is given in great detail (1 tab.) will be consulted in the original by those interested. Treatment led not to haemoglobin levels or white cell numbers of the blood and there were no changes in urine. Only one European (included in the first series) showed yellow colouration of the skin and conjunctivae. Anorexia, low blood sugar and vomiting occurred in some groups of patients. In one a pruritic and a herpesiform rash occurred possibly due to schistosome death. No serious toxic manifestations were noted. The drug did not accumulate in the

body, and was estimated in blood by the method of LATNER *et al* [this *Bulletin*, 1948, v 45, 96]

As supplies were limited, only one African patient in each instance was treated with Miracil A, B and C respectively, the total dosage being 1.5 to 1.8 gm in a period of two weeks. These substances are xanthenes in which the sulphur atom of Miracil D has been replaced by oxygen, together with other minor changes in the molecule. No cures were obtained. Evidence has been obtained that a large proportion of patients harbouring *S. haematobium* can be sterilized of this infection by safe doses of Miracil D, but *S. mansoni* responds less well to treatment. The intensity of dosage appears to modify the results obtained and further investigation is indicated, particularly in order to define more accurately the maximum tolerated dose, whether dangerous idiosyncrasies exist and how the therapeutic effect of large doses compares with that of antimonials.

J D Fulton

ZIEVE, L & CONLEY, R H. Chronic Schistosomiasis Japonica diagnosed by Rectal Biopsy. Report of Case. *Minnesota Med* 1948, Dec, v 31, 1331

OLIVIER, L. The Penetration of Dermatitis-producing Schistosome Cercariae. *Amer J Hyg* 1949, Mar, v 49, No 2, 134-9

"Observations were made on the penetration of human skin by cercariae of *Trichobilharzia stagnicolae*, the chief cause of schistosome dermatitis in the United States. It was found that the cercariae will penetrate while fully submerged and, therefore, do not require an evaporating film of water to stimulate or aid penetration. In some tests the cercariae penetrated from relatively cool water (17°C to 23.5°C), the temperature of which changed little during the exposure period. It was also found that the itching associated with penetration of the cercariae occurs very soon after the cercarial body enters the outermost layer of the skin and that, therefore, this primary itching may be taken as a reliable indicator of the time of penetration of the cercariae. Primary itching was found to begin from 4 to 10 or more minutes after the cercariae were placed on the skin, indicating that the cercariae remain on the surface of the skin for some time before penetrating."

OLIVIER, L. Schistosome Dermatitis, a Sensitization Phenomenon. *Amer J Hyg* 1949, May, v 49, No 3, 290-302, 2 figs [15 refs]

In 1928 CORT [this *Bulletin*, 1928, v 25, 946] showed "swimmers' itch" in Michigan, U.S.A., to be due to non-human schistosome cercariae. MACFARLANE [*ibid*, 1944, v 41, 947] identified a non-human schistosome cercaria causing a similar condition in New Zealand, and suggested that sensitization resulted from repeated exposure to it. The matter was deemed worthy of further study. Cercariae of *Trichobilharzia stagnicolae* from the snail *Stagnicola emarginata angulata*, of *Trichobilharzia ocellata* from *Lymnaea stagnalis*, and of *Schistosomatium douilii* from *Stagnicola palustris* were applied to the forearms of volunteers at the N I H laboratory, Bethesda, and at the University Biological Station, Michigan. Typical schistosomal dermatitis was produced in susceptible persons by any of these, and the lesions produced were undifferentiable.

Of 34 persons exposed for the first time (as far as could be ascertained) to cercariae of *Trichobilharzia stagnicolae* all but one suffered only a mild reaction with inconspicuous lesions. The odd case had a more severe reaction, and investigation of his history suggested he might have been exposed to *Schistosoma mansoni* cercariae in Porto Rico previously. Twenty-seven volunteers were then exposed to from 2 to 8 further attacks by the same

cercariae at irregular intervals (a few days to about 120 days) and increasing reactions culminating in some cases in typical schistosome dermatitis developed in 21 of them. In some of these persons on re-exposure to infection reactivation of earlier lesions was observed. The reactions were not a local phenomenon as changes in the site of application of the cercariae still produced them—they were essentially allergic in nature and there is evidence that a sensitization once acquired may persist for some years. *A. R. D. Adams*

KENDALL, S. B. *Limnaea stagnalis* as an Intermediate Host of *Fasciola hepatica* [Correspondence] *Nature* 1949 June 4 880-81

Hitherto the possibility of British species of *Limnaea* other than *L. truncatella* acting as vectors of *Fasciola hepatica* has been open to doubt. The author now describes experiments carried out at Weybridge Veterinary Laboratory which prove that *F. hepatica* is capable of completing its development in *L. stagnalis* with the emergence of cercariae and ultimate infestation in mammals.

The snails used were freshly hatched second generation specimens reared in the laboratory under strict conditions. Massive exposure to fresh miracidia of *F. hepatica* resulted in infection occurring in 13 of 101 experimental snails from one of these 99 perfect cercariae emerged and four of these infected a rabbit orally. In six weeks a half-grown *F. hepatica* was recovered from the bile ducts.

Failures by previous workers to infect adult specimens of *L. stagnalis* are referred to and it is suggested that immature specimens are more susceptible than are adults.

The author suggests however that this observation may have little significance from the veterinary point of view because of the aquatic habit of *L. stagnalis*, which appears to be confined to permanent water. The biological significance of the finding is however stressed and is being followed up in relation to other species of *Limnaea*. *H. J. O'D. Burke-Gaffney*

FUERTES DELGADO, M. Formas autotomoclinicas de la cisticercosis cerebral [Anatomical and Clinical Forms of Cerebral Cysticercosis.] *Cac. Med. de Mexico* 1948 Aug 31 v 78 No. 3 154-73 7 figs on 6 pls

DESCHERES, R. Les substances toxiques vermifuges leur pouvoir pathogène leur identification [The Pathogenic Power of Toxic Substances in Helminths.] *Ann. Inst. Pasteur* 1948, Nov v 73 No. 5 397-410 5 figs. [22 refs.]

The following is a free translation from the French of the author's summary.

Pathogenic products of helminthic origin can be divided into two groups according to the nature of their effects. 1. Polypeptide toxic substances. 2. Protein globopied and polysaccharide (sic ² polysaccharide) substances having allergic and anaphylactic properties. Those of the second group are eosinophilogenous—those of the first group are not.

The pathogenic action of toxic helminthic substances can be demonstrated experimentally in guinea-pig, cat and rabbit either by acute or chronic intoxication—the disease caused by this experimental method resembles that occurring under natural conditions.

Acute and chronic intoxication due to toxic helminthic substances produces biological reactions and a symptomatology comparable with those of acute or chronic histamine intoxication.

The pathological anatomy of lesions due to chronic helminthic intoxication consists of inflammatory oedematous infiltration and necroses which are selective in lungs, kidneys and liver. A plastic helminthic anaemia is also often observed.

The toxic helminthic substances belonging to the polypeptide group are not identifiable with histamine, but they can be assumed legitimately to be basically amine or amino-acid and related to, or capable of liberating or forming, histamine in the organism.

Helminthic substances having allergic or anaphylactic properties are distinct from toxic helminthic substances, they seem to resemble in particular protein fractions properly speaking, gluco-proteins and polyholsides.

From the practical aspect, bearing in mind that fundamentally the treatment of helminthiasis belongs to the sphere of chemotherapy and galenotherapy, a knowledge of toxic helminthic substances is concerned not merely with the interpretation of certain parasitic diseases, but also with the possibility of arriving at antitoxic and symptomatic treatment in acute conditions.

J J C Buckley

DESCHIENS, R & POIRIER, M. Anatomie pathologique de l'intoxication expérimentale subaiguë et chronique par les substances toxiques vermineuses [Pathology of Subacute and Chronic Intoxication in Experimental Animals by Toxic Helminth Extracts] *Bull Soc Path Exot* 1949, v 42, Nos 1/2, 70-75, 4 figs on 2 pls

The authors' experiments with laboratory animals on the effects of injecting extracts of *Ascaris megaloccephala*, *Taenia saginata* and hydatid fluid show that both in regard to the localization and the nature of the lesions produced, the three substances have a homogeneous character. The respiratory organs, the liver and kidneys are always affected in degrees which vary with the nature of the substance and dosage employed. The *Taenia* extract produces signs of congestion, irritation and oedema and rarely, degeneration. The hydatid fluid is more toxic and gives rise to inflammation, not infrequently with degeneration and necrosis and also haemorrhage. The *Ascaris* extract is particularly toxic and produces inflammation, degeneration and haemorrhage. Although anaemia is not always present, hyper-leucocytosis, usually without eosinophilia, is a constant feature of the toxic effects. The lesions exhibit a marked analogy with those produced in guinea-pigs by administration of histamine.

J J C Buckley

NEWTON, W L, BENNETT, H J & FIGGAT, W B. Observations on the Effects of various Sewage Treatment Processes upon Eggs of *Taenia saginata* *Amer J Hyg* 1949, Mar, v 49, No 2, 166-75 [12 refs]

"Experiments were set up for the evaluation of the effects of various sewage treatment processes upon eggs of *Taenia saginata*. The results and observations obtained before the limited supply of material was exhausted are presented.

"Twenty experiments were performed to observe the settling characteristics of *T. saginata* eggs in an 18-inch column of raw sewage. The settling rates obtained were as follows: 65 per cent of the eggs, 0.6 inch per minute or faster; 16 per cent, 0.3 to 0.6 inch per minute; and 17 per cent, 0.15 to 0.3 inch per minute. These results indicate that sedimentation of raw sewage with moderate overflow rates and for 1-to-2-hour detention periods would remove the majority of the eggs. However, even under optimal conditions a significant percentage of influent eggs would escape the effluent.

"Seven experiments were conducted with the sand filtration process. A 12-inch column of sand, 0.5-millimeter effective size, was used. The filtration

rate was 1 000 000 gallons per acre per day and effluents contained 50,000 to 200 000 *T. saginata* eggs. The failure to recover eggs in the effluents, with one exception (0.4 per cent recovery) at this extreme of operational conditions indicates that the process would be a very effective method of checking the spread of *T. saginata* eggs in primary effluent.

"On the basis of the results obtained from two digesting sludge experiments still in progress it would appear that this process is very slow in destroying *T. saginata* eggs. While there has been an obvious deterioration of many of the eggs, apparently normal eggs have been recovered from sludge after 6 months of digestion at 75° to 85° F.

Two experiments were performed with a laboratory-model trickling filter operated at rather slow rates. Recoveries of 30 and 38 per cent of infective eggs suggested that this process would not provide adequate protection against an effluent contaminated with *T. saginata* eggs.

One experiment with the activated sludge process still in progress indicates that this process would have little effect upon *T. saginata* eggs. After 5 months of aeration there has been no noticeable effect upon the eggs as determined by microscopic examination.

"The results of these experiments indicate that, if sewage were contaminated with *T. saginata* eggs, the usual treatment processes (with the exception of sand filtration) could not be relied upon to produce effluent or sludge free of viable eggs.

NEGUETE R. A. FAIGUENBAUM A. J., PILOTTI A. M. & SILVA CANTOS P.
Algunos aspectos epidemiológicos de la hidatidosis humana en Chile
[Some Epidemiological Features of Hydatid Disease in Man in Chile] *Rev. Chilena de Hg. y Med. Preventiva* 1949 Dec. v 10 No. 4 197-207

This study is based on the records of the 17 years 1933-1944 inclusive. Though the actual number of cases of hydatid infestation has more than doubled—from 189 in 1933 to 399 in 1944-45 (in 1941 it reached 415)—and the ratio per 100 000 inhabitants has risen from 4.68 to 7.91 (7.91 in 1947) it is not certain that the numbers have really increased to anything like this extent: diagnosis is better and more hospital beds have been available so that the numbers of patients admitted for treatment of all diseases has risen. For estimating the geographical distribution the country has been divided into five zones: north, central, south, austral and North Chile. Most cases occur in the central zone with the Provinces of Valparaíso, Santiago and Maipo. It is agricultural and largely given up to cattle-raising. As regards sex distribution male patients are slightly in excess of female but the difference is not significant. The ages of 1495 patients during the 17 years were ascertained and 1407 (48.9 per cent) were in the 20-39 year group and 71 (23.7 per cent) in the 40-59 year group but there were 616 (20.7) in the second decade. The fatality rate has remained fairly stationary except for a rise in 1941. The reduction since that year is ascribed partly to earlier diagnosis and partly to improved surgical technique. The chief cause of spread of infection is as usual the close connexion between dogs and cattle: some 30-78 per cent of dogs around slaughter-houses being infested with *Echinococcus granulosus*.

H. Harold Seed

QUEENSLAND ANNUAL REPORT OF THE HEALTH AND MEDICAL SERVICE OF THE STATE OF QUEENSLAND FOR THE YEAR 1947-48, pp. 32-4 Hookworm Campaign THOMPSON S.

In July 1947 the field hookworm campaign in Queensland was staffed by macroscopist 3 residential sisters and field inspector. There was close co-operation with the Weil's disease staff.

A large table gives detailed figures showing the topographical distribution of laboratory examinations and treatments. It is noted that 622 of 4,787 specimens were positive for hookworm. 320 of the infected persons have been treated to a cure. In all, 756 specimens contained other parasitic worms.

In each area inspected, arrangements were made with the local medical officers for 25 children under 3 years to be treated and observed in hospital. Of 1,977 school children, 88 harboured hookworm and 252 had other helminthic infections. 40 of the hookworm hosts have been treated to a cure.

Practical measures included spreading of lime on infected soil in the aboriginal reserve, inspection of sanitation at the homes of infected persons and close co-operation with medical, health, educational and mission authorities.

[References to co-operation with the staff of another campaign show evidence of an admirable spirit but it is often to be asked, when health campaigns are undertaken in large and remote areas, whether multiplication of *ad hoc* survey or treatment teams is to be preferred to health teams with a broader mandate, equipped to deal with any of the local health problems as they are encountered.]

H J O'D Burke-Gaffney

FLOCH, H & CAMAIN, R. Sur un nouveau cas de pseudo myiase rampante à *Ancylostoma brasiliense* en Guyane française [A New Case of Creeping Eruption due to *Ancylostoma brasiliense* in French Guiana] *Bull Soc Path Exot* 1949, v 42, Nos 1/2, 29-33, 5 figs

Observations were made upon a creeping eruption which appeared on the thigh of a male child of 3 months in French Guiana. The condition first appeared as a thread-like ridge which grew to about 1 centimetre long in two days. During the period, 25th July, 1947, to 30th August, 1947, the course of the track, which is illustrated by a drawing, was observed. Biopsy was then performed under a local anaesthetic, on the terminal part of the track, after which the condition cleared up and did not recur. Serial sections (15 μ thick) of the excised piece of skin revealed a nematode 650 μ long by about 20 μ in width, in the dermis lying parallel to the skin surface. Reaction in the neighbourhood of the worm included dermal necrosis and cellular infiltration with monocytes and lymphocytes, but no eosinophilia was noted.

The parasite is armed at the anterior extremity with a strong pair of curved teeth, 4 μ long by 3.5 μ diameter at the base. 9 μ posterior to these are two folds meeting in the middle line, which apparently represent a buccal capsule. Then follows an alimentary canal of 4 μ to 6 μ in width. On morphological grounds the parasite is tentatively identified as *A. brasiliense*.

J J C Buckley

DE OLIVEIRA, P. P. Strongiloidose, problema sanitário. Incidência numa coletividade militar (1° GAC Motorizado) [Infestation by *Strongyloides stercoralis* a Sanitary Problem] *Hospital* Rio de Janeiro 1949, Mar, v 35, No 3, 437-43, 5 figs

The author, an Army Medical Officer, examined the faeces of 299 recruits in the Province of Espírito Santo, using Baermann's method, and found the larvae of *Strongyloides stercoralis* in 82 of them (27.4 per cent).

This helminth causes considerable disturbance—colic and diarrhoea, asthmatic attacks as the larvae pass through the lungs, blood changes of haemolysis, leucocytosis and eosinophilia. Considering that so many individuals who should be in good health, as recruits, harbour this parasite, the question is clearly one not only of medical but of public health concern.

H Harold Scott

- BALDWIN E. & MOYLE, V. A Contribution to the Physiology and Pharmacology of *Ascaris lumbricoides* from the Fig. *Brit. J. Pharmacol. & Chemotherapy* 1949 June v 4 No. 2, 145-52, 8 figs. [23 refs.]
[See also this *Bulletin* 1949, v 45 921]

- DAVENPORT H. E. The Haemoglobins of *Ascaris lumbricoides*. *Proc Roy Soc Ser B*, 1949 June 23 v 136, No. 833 253-70 7 figs. [11 refs.]

- DAVENPORT H. E. *Ascaris* Haemoglobin as an Indicator of the Oxygen produced by Isolated Chloroplasts. *Proc Roy Soc Ser B*, 1949 June 23, v 136 No 833 281-90 4 figs.

- SPRENT J. F. A. & CHEN H. H. Immunological Studies in Mice Infected with the Larvae of *Ascaris lumbricoides*. I. Criteria of Immunity and Immunizing Effect of Isolated Worm Thymus. *J. Infect. Dis.* 1949, Mar Apr v 81 v 2 111-4 13 figs. [23 refs.]

- FÉRON J. Sur le traitement de l'éléphantiasis des membres. [The Treatment of Elephantiasis of the Limbs.] *Bull Soc Path. Exot* 1949 v 44, Nov. 34 118-22, 3 figs.

The author claims that elephantiasis of the legs of streptococcal origin is rapidly cured by intramuscular injections of Rubiazol (a sulphonamide preparation) on three days a week and intravenous injections at similar intervals of solution composed of —

Sodium thiosulphate 0.4 gm.
Magnesium thiosulphate 0.1 gm.
Distilled water 5 cc.

The latter method has been commercialized under the title of desensitizing injection and is thought to reinforce the action of Rubiazol: this form of therapy can be supplemented by intravenous injections of iron and calcium gluconate.

The reduction of the swelling is aided by means of compression by an elastic bandage which clears away the oedema. This paper is illustrated by three photographs depicting the one case described. (The evidence is by no means convincing, as the elephantiasis is of moderate degree only and the diminution of the oedema could be attributed to compression by the elastic bandage.)

P. MARION BAKER

- BUCKLEY J. J. C. Studies on Human Onchocerciasis and *S. mal. m.* in Nyanza Province, Kenya. I. Distribution and Incidence of *O. viverrini*. *J. Helminthology* 1949 v 23, Nov 1/2, 1-4 2 maps & 5 graphs. [11 refs.]

This paper is the first of a series which will describe an investigation into onchocerciasis and its vector *S. mal. m.* in the Nyanza Province of Kenya. Five foci of the disease were studied: all lay in the altitude range of just below 5 000 feet to just below 6 000 feet. Onchocerciasis was absent in the low-lying plains and in the higher mountains. The five infected localities were Kodera, Ruana (a focus discovered for the first time) Kuja River, Lumbwa and North Kauroodo. Preliminary surveys were undertaken in the first four by the taking of skin snaps from members of the population. The author used the method he had devised for detecting *O. pectus* in the skin of cattle in Malaya. The skin is pinched up between the thumb and forefinger and a very

thin piece about 5 mm in diameter is sliced off with a sharp razor. The skin snip is placed in a drop of saline on a slide, is allowed to stand a few minutes, and is then examined under a low magnification ($\times 230$). The microfilariae are readily detected in the saline. No local anaesthetic is necessary and centrifugation need not be employed. The distribution of microfilariae in the skin of different parts of the body varies so enormously that quantitative estimations are useless; in one case, there were two microfilariae in a skin snip from the thigh and 393 in another piece of similar size taken only 3 cm away.

The incidence of the disease was then studied in detail, and observations were made on the ocular effects, cutaneous manifestations and abnormal skin conditions. The incidence in the population increased progressively with age, as the cumulative result of exposure to infection over a long period. Microfilariae probably first appear in the skin between the ages of 2 and 3 years; children of this age in one locality showed a 19 per cent infection rate, then from 5-7 years, 29 per cent and 8-10 years, 34 per cent. In the young adults the rates rose to 55 per cent and in the oldest age group to a maximum of nearly 80 per cent. In most localities men were more affected than women, probably because the men spend more time in surroundings infested with *Simulium*, among the Kisu tribe, however, for a reason not understood, the women suffer more than the men. The effects of the disease in some of the highly infected areas are shown below.

(Percentages)

Place	Positive Skin Snips	Eye Lesions	Nodules	Abnormal Skin
Kodera	48	9	5	15
Riana	21	2	3	15
Lumbwa	29	2	3	9
N Kavirondo	72	10	24	25

It was thought that the eye affections were probably much more common than these figures suggest; many blind people remained in their houses. It was not always possible to assess the rôle played by *O. volvulus* in the causation of these affections—particularly the eye and skin manifestations.

The foci of the disease were always associated with the presence of *Simulium neavei*, the principal species to bite man in Kenya. The ecological requirements of this insect were clearly revealed, fast-running rivers, a hilly terrain, well-wooded banks, and probably certain temperature requirements which tend to limit the species to altitudes well below 7,000 feet.

The survey embraced the examination of 5842 Africans and is the most comprehensive of any yet reported from Kenya. Details are given of the incidence in the smaller localities, in mines and elsewhere.

P C C Garnham

BURCH, T. A. Experimental Therapy of Onchocerciasis with Suramin and Hetrazan. *Bol. Oficina Sanitaria Panamericana* 1949, Mar., v 28, No 3, 233-48 [12 refs.]

At a clinic established in an area of Guatemala where onchocerciasis is endemic, 182 patients were treated; the report deals with 108 of these patients.

Fifty-six patients were treated with naphuride sodium (Suramin). In the first 12 cases they were given intravenous doses of 0.02 gramme per kilo body-weight, but the remainder were given only 0.5 gramme initially followed by 1.0 gramme weekly, for 5 to 7 weeks, a total dosage ranging from 0.31 to

0.07 gramme/kilo. Details of 48 patients are given, of which 43 showed microfilaria in skin biopsies before treatment. At the end of treatment 70 showed negative biopsies (at least four such) of which 13 were still negative at the end of 5-6 months. At the end of 7-8 months, of the 13 cases followed, 12 were negative—five of these had been positive at an earlier post treatment stage but none of them later than 1-2 months.

The reactions were annoying and discouraged at least half the patients from continuing treatment until it was complete but in none was it really necessary to discontinue—these reactions apparently due directly to the drug, were burning of the feet or palms and occasionally peeling or fissuring, muscle and joint pains, nausea, abdominal cramps, headaches, sleepiness and transitory swelling of the lips. Other reactions that were apparently due to the effect of the drug on the onchocerca were ocular reactions, pruritus, local induration, fever and "peculiar feelings" inside the onchocerca lesions.

Fifty-two patients were treated with Ihetrazan—of these 11 were given a total dosage of 20 to 46 mgm. per kilo. body weight with an initial dose of 0.5 mgm. per kilo. in 8 cases. Later an initial dose of 0.1 mgm. per kilo. was given and the dose was increased gradually—only three of the latter group received more than a total dose of 18 mgm. per kilo.

The effect of treatment was dramatic in the former group. Two patients showed no microfilariae throughout. Of the other 9 one only (20 mgm.) showed microfilariae at the end of treatment—the rest were also negative after 1 month, but microfilariae returned in two cases at 3-4 months—in one case at 5-6 months and in two more at 7-8 months so that only 3 of the original 9 microfilaria-positive cases remained free after 7-8 months, but another patient positive at 3-4 months became negative subsequently. Of the group receiving smaller doses only 7 showed no return of microfilariae but these were not followed for a sufficiently long time to make the observation important.

The side-effects with Ihetrazan were more serious. In seven cases the course of treatment was modified or stopped on account of them and many other patients refused to continue the drug. The side-effects included headache, general malaise, weakness, fainting spells and vertigo, abdominal cramps, aching pains in the joints and teeth, pruritus (in 43 cases), ocular reactions (in 22 cases), induration and oedema, papular eruption, and fever. These latter symptoms were as in the case of Suramin treatment, attributed to foreign protein from killed worms.

The results of treatment with comparable doses of Ihetrazan in *Wuchereria bancrofti* infection [SANTIAGO-STEVENSON *et al.* this *Bulletin* 1948, v 45 355] were not as good since only 1 out of 7 patients observed remained free from microfilariae after 7-8 months but with larger doses 73 to 135 mgm. 3 out of 4 were free from microfilariae after this period of observation.

L. E. Napier

MARTÍNEZ RÍVEZ, M. Consideraciones sobre el examen de los nodulos oncocercosos en la investigación de la acción macrofilaricida de algunas drogas. (Examination of *Onchocerca* Nodules in studying the Effect of Drugs on the Adult Worms.) *Rev Inst Sal. P.ública y E. Farmacéut. Trop. México* 1949 Mar 10 No. 1 17-27 8 figs.

The success of Ihetrazan in ridding the body of embryos of *O. viverrini* has been reported so often that it may now be taken as proved. As regards the action of the drug on adult worms opinion is not settled. Some of degeneration in the worms has been noted and examination of nodules reveal scarce embryos—they may be absent altogether—and those present are distorted, moribund and even dead.

In this article the author indicates how cautious we should be in interpreting these effects as due to the drug. He examined 300 nodules extirpated from supposed *Onchocerca* infections, fixing and staining the tissues in various ways. Twenty-one proved not to be *Onchocerca* nodules, but lymphatic glands, sebaceous cysts and the like, 168 (56 per cent of the total, 60 per cent of the true *Onchocerca* nodules) contained adult worms. Some [proportion not stated] appeared normal, with eggs and embryos, others were more or less degenerated, with contorted, ill-defined outline and tissues necrotic or on the way to becoming so, with musculature fragmenting, in short all the signs which have been recorded as following the administration of Hetrazan, although the patients from whom these tumours had been taken had had no treatment. Another good example of the *post ergo propter* fallacy

H Harold Scott

SANDOSHAM, A A A Case of Human Gnathostomiasis in Malaya. *J Helminthology* 1949, v 23, Nos 1/2, 71-2, 1 fig

The first record of human gnathostomiasis in Malaya was made by SAMY [this *Bulletin*, 1919, v 13, 213] the case now recorded is the second from Malaya. The worm was removed from the pulp of a finger of a Chinese woman in 1947 she had emigrated from China as a child and had lived near Ipoh for 29 years

The worm presented at the advancing end of a raised linear track extending from a septic swelling over the nail bed. It appeared as a black object under the skin and had taken five days to travel from the dorsum of the finger to the pulp. Removal of the worm was followed by rapid healing. Morphological details of the worm are given and illustrated with line diagrams

The author refers to previous records from Asia [this *Bulletin*, 1934, v 31, 801, 1936, v 33, 136, 1945, v 42, 919] Some of the Chinese in Malaya are given to eating raw freshwater fish and human gnathostomiasis may be commoner than has been suspected

It was not possible to determine the species with certainty, but it is suggested that the specimen was a larval form of *Gnathostoma spinigerum*, which (with *G. hispidum*) has been recorded from domestic animals in Malaya

H J O'D Burke-Gaffney

EBERT, Carla Oxyuren-Nachweis mittels Cellophanklebestreifen [Demonstration of *Enterobius* by the "Cellophane" Method] *Med Klin* 1949, Mar 25, v 44, No 12, 375, 1 fig

The author has modified the older method of making a smear preparation from "Cellophane" anal swab for recognition of *Enterobius* eggs. She attaches an adhesive "Cellophane" strip some 6 cm long and 1.5 cm. broad in the anal cleft, presses it against the anus and leaves it overnight. The female worms come out, deposit their eggs and, in the morning when a smear is made on a slide, ova in large quantity and the worms themselves may be seen by low magnification. Of 250 children between the ages of 2 and 14 years examined thus, 217 (87 per cent) were positive, whereas by the older smear method only 120 (48 per cent) were positive. Another advantage is that the procedure can be carried out in the home by the mother and preparations can be kept for a week if necessary before being examined

H Harold Scott

KETELSLEGERS, J L'appendicite vermineuse par oxyures [Appendicitis from *Enterobius* Infestation] *Rev Belge Sci Méd* 1946, Oct, v 17, No 5, 295-314, 7 figs on 2 pls [45 refs]

In 1901, Metchnikoff first drew attention to the association between worm infections and appendicitis. Since this date there have been many reports

confirming this association the worms usually incriminated are *Axaru lumbricoides*, *Trichuris trichiura* and *Enterobius vermicularis*.

In 23 appendices of children, eggs of one or more of these worms were found in 12 instances, and in 11 appendices of adults in 5 instances. *Enterobius* with or without other worms was present in 8 children and 2 adults.

A number of clinical histories are given together with pathological details of the removed appendices.

The conclusions at which the author arrives are—that *Enterobius* undoubtedly plays an important rôle in the pathology of chronic and subacute appendicitis, and that in acute appendicitis it favours the action of the bacteria, especially in children—that these worms invade the mucous membrane causing erosions and ulcers, and enter Lieberkühn's glands and lymph follicles, disturbing the entire structure of the tissues and causing hæmorrhages of varying degrees in the tissues invaded, and that, even in the absence of lesions, they leave traces of their presence in the tissues—that although the clinical diagnosis did not always correspond with the histological, on the whole the histological picture presented in the cases of acute and subacute appendicitis were distension of Lieberkühn's gland with mucus, hyperplasia and often an increase in lymph follicles and simple hyperplasia of lymph glands—and that in all cases where *Enterobius* was present there was distinct hypereosinophilia, especially in the areas of hæmorrhagic infiltration.

L. E. Napier

SCHÖFFNER, W. Kritische Betrachtung der Oxyuriasis-Therapie und Vorschläge für die praktische Ausführung [Critical Inquiry into the Treatment of *Enterobius* Infestation and Hints on Practice.] *Med. Klin.* 1949 Mar 19 v 44 No. 11 334-8. [15 refs.]

It is obvious that a cure of *Enterobius* infestation can be claimed only if the worms are cleared out and do not return, excluding of course re-infestation. The author has shown by human experiment that development may be slower than is generally thought viz. 14-35 days according to Heller to 60 days according to Faust—he found that as long as 83 days might lapse between ingestion of ova and appearance of fresh ova in the faeces from the developing worms—the shortest interval was 37 days. Distinction is made between re-infection (or fresh infection) and retrograde infection or retrofection in which the larva develops after the egg is extruded and then crawls back into the anus and develops in the ordinary way. Early worms, i.e. those seen in the first 37 days, may be either such as are resistant to the drug used (or the drug was given in too small a dose) or the drug, having acted on the adult gravid (females) has no action on the younger immature forms and these develop normally or thirdly they may have hidden themselves in the appendix or in some spot where the drug has not reached them.

It has been said that 10-14 days after the treatment there should be an examination for ova and if they are found the course should be repeated. The author does not agree with this. One should bear in mind what he has stated above—that development of the worm may be slow and eggs passed later than the 14 days. Also ova from worms which had hidden in the appendix might appear later and would be no proof that the drug was ineffectual, as it would have acted only on those worms which were accessible to it. Daily search for ova is necessary for gauging the results of treatment, and only when there are definite indications that the course has failed should it be repeated or another drug be tried. Quoting from the literature the author mentions several drugs which have been recommended—oil of chenopodium, gentian violet, crystal violet, phenothiazine and others. Preventive measures must vary according to the method of infection, whether this be digital transference

indirect contact by eggs on food, retrofection and dust infection, but all such measures may be summed up in cleanly habits, washing of hands and "anal toilet"

H Harold Scott

NEGhme, A Present Status of Trichinosis in Santiago, Chile *J Parasitology* 1949, Apr, v 35, No 2, 136-7

Between 1938-48 small familial epidemics of trichinosis have occurred in the province of Santiago, Chile, where some 50 human cases occur annually. In 1944, autopsy of diaphragm muscle from 296 persons dying in Santiago hospital revealed the presence of trichinae in 12.5 per cent. Although the disease is endemic in Chile, it is mostly benign and mortality in recognized cases is very low. The author illustrates this by reference to an outbreak described by him and his collaborators from a Military School in Santiago in 1947 [this *Bulletin*, 1948, v 45, 356].

In the same year, 157 acute cases of trichinosis were found in Santiago between July and October—a month before the epidemic began, many hogs had been slaughtered and a transient shortage of beef at that time had led to an increased consumption of pork.

Surveys in the municipal slaughterhouse revealed an incidence of trichinae among hogs of 0.2 to 0.3 per cent, the highest being in animals raised in garbage lots. Microscopic inspection of slaughtered hogs for trichinae is compulsory in Chile, but a survey of 52 slaughterhouses in Santiago province suggest that this was being done as a routine measure in only five establishments.

New regulations were introduced in 1947, whereby hogs shall be slaughtered only in slaughterhouses where microscopic examinations for trichinae are carried out as a routine—eight specimens of muscle from each hog must be examined—the raising of hogs in garbage lots and feeding them with uncooked garbage are prohibited. In connexion with this, it was found that 5 per cent of 822 hogs in one garbage lot harboured the parasite, as did 8 per cent of 200 rats trapped on the same premises.

While the author agrees with GOULD [this *Bulletin*, 1946, v 43, 578] that processing pork is the most effective method of controlling trichinosis, such measures are not feasible in Santiago at present. Reliance must therefore be placed on the new regulations and on education of the public. It is added that microscopical inspection, especially with the phototrichinoscope, has not proved to be so expensive in Chile as it has been reported to be in other countries.

H J O'D Burke-Gaffney

NEGhme R, A, HOECKER S, G & FELNER P, Eva Incidencia de Triquinosis en las ratas de basural y su posible relación con el grado de infestación de los cerdos criados en el mismo sitio [Incidence of Trichinosis in Rats from Garbage and its possible relationship to Pigs reared in the same Place.] *Rev Chilena de Hig y Med Preventiva* 1948, Dec, v 10, No 4, 209-12

The English summary appended to the paper is as follows —

"The authors have examined 200 rats trapped in a garbage-lot of Santiago, Chile, and found 8% infected with *Trichinella spiralis*.

"They discuss the relationship between this finding and the high incidence of Trichinosis (5.1%) found in 822 hogs reared in the same place."

DEFICIENCY DISEASES

WOOD I. J., GARLICK, H. W., MOTTERAM R., WEIDEN S., MOORE, A., MACKAY M. & TURNER, C. V. Nutritional Disease of the Liver. *Med J Australia*, 1949 Apr 23 v 1 No 17 541 7 1 fig. [25 refs.]

The occurrence of fatty infiltration of the liver and its development through periportal fibrosis to Laennec cirrhosis as a result of malnutrition, particularly protein deficiency has been frequently described in recent years. The studies of early cases have been made largely in children and the end results in adults have been increasingly recognized.

The authors describe the development of nutritional disease of the liver in eighteen adult patients. The commonest cause of the malnutrition was chronic alcoholism, but in a minority of cases the causes included other organic diseases, dietetic obsessions, poverty or a solitary existence. The later results of the condition have been long known, but attributed primarily to alcoholism; the importance of malnutrition as the main causative factor has been insufficiently recognized. The cases were studied clinically and biochemically, and material for histological study was obtained by aspiration biopsy of the liver.

The main clinical manifestations of nutritional liver disease were limited: mental depression, muscular weakness, and failure of memory and concentration, with anorexia, nausea and morning vomiting. Jaundice was occasionally seen and haematemesis was not uncommon, especially in the advanced cases. The liver was usually enlarged, and vascular changes included dilatation of superficial veins, blood-shot eyes and occasional scattered spider naevi. Associated manifestations of vitamin deficiency included peripheral purpura, petechial haemorrhages, atrophy of the tongue and angular stomatitis. A reliable dietetic history was difficult to obtain from the alcoholic patients, but persevering inquiry revealed the true aetiology of the condition.

Biochemical investigations showed that liver function tests (serum bilirubin, cephalin flocculation, hippuric acid excretion, urine urobilinogen alkaline phosphatase) give results within normal limits in early cases but are a reliable guide to prognosis in more advanced cases. [The bromsulphthalein clearance test regarded by some workers as the most sensitive liver function test in this type of condition (WATERLOW this *Bulletin* 1949 v 45 724) was not done.] Total plasma protein was usually low and there was marked inversion of the albumin/globulin ratio. Liver biopsy showed, in different individuals, the progress from fatty infiltration to portal cirrhosis, and was also useful in establishing diagnosis and prognosis.

Treatment consisted mainly in the giving of a liberal well-balanced diet rich in protein and vitamins. The advantage of adding lipotropic substances such as choline is still doubtful. It is of the greatest importance that intercurrent infection should be controlled and toxic substances such as alcohol must be withdrawn. In the fatty phase of this disease the condition is apparently completely reversible, the prognosis being progressively worse as the amount of fibrosis increases, but even in advanced cases with established portal cirrhosis a suitable régime may retard or arrest the downward trend. *Dean A. Smith*

STRANGWAY W. E. & STRANGWAY ALICE H. Ascorbic Acid Deficiency in the African Disease Ouyalai. *Arch. Intern. Med.* 1949 Apr v 83 No. 4 577-8 1 fig.

Ouyalai is a form of thrombopenic purpura, of hitherto unknown aetiology described in many parts of Africa and characterized by the formation of

haemorrhagic bullae on mucous membranes, haemorrhages from the intestinal and urinary tracts and a high mortality. Of 150 patients suffering from onyala admitted to a hospital in Angola up to 1940, 90 per cent died.

Dietary investigation of patients in the area of Angola concerned, revealed a very low intake of ascorbic acid, especially during the hungry season when the incidence of onyala is at its highest. Accordingly, treatment with large doses of lemon juice, pure ascorbic acid not being available, was tried and proved effective. The amounts given were large, ranging from 2 to 20 litres, and recovery within a few days occurred in all but one of 43 patients. When synthetic ascorbic acid became available it proved equally effective, the total dosage varying from 2 to 8 gm. Intravenous administration was necessary in severe cases, and 9 out of 10 patients recovered within seven days.

These findings strongly indicate that onyala is due to dietary ascorbic acid deficiency. One observation, however, throws doubt on this as the complete explanation of the aetiology of the disease. In three untreated patients ascorbic acid excretion in the urine was found to be between 50 and 100 mgm per 24 hours, a rate of excretion greater than that of normal Africans. It may be postulated that, while a low ascorbic acid intake is a predisposing condition, the onset of the disease is determined by excessive excretion, with consequent rapid tissue depletion, by some toxic mechanism. This hypothesis gains some support from the very high dosage necessary to achieve a cure, a dosage much in excess of that needed for the treatment of scurvy. [See also RIGBY below, p 873.]

Dean A. Smith

SPRUE

KEELE, K. D. The Prognosis and Treatment of Sprue in India. *Brit Med J* 1949, June 4, 986-9, 1 chart

In a clinical survey of 600 cases of sprue during the recent war it was ascertained that only 31 per cent had reached the stage of complete remission of the disease before evacuation from India. The object of the present paper is to assess the prognosis and results of treatment of 62 others in the follow-up period of two years in England, so that the value of methods of treatment at that time employed may be judged in perspective. In general, cases were treated, on admission, by diet alone. When this failed, the patient was given "an investigation diet" from which therapeutic substances, such as liver, were omitted. With this diet it was possible to assess the effect of parenteral liver, nicotinic acid and riboflavin. Cases which responded satisfactorily to diet were classified as mild sprue; those which failed to do so as severe sprue.

Criteria of progress (short term) were assessed by appearance of signs of the remission phase. These constituted, gain in weight, cessation of diarrhoea, steatorrhoea and abdominal distension were the last signs to disappear. Criteria of complete remission were restoration of weight to within 10 lb of normal, stools normal in number, colour and fat content and absence of abdominal distension. Criteria of long term progress (after 2 years) were based (1) upon complete fitness since return from India, (2) loss of time from work with symptoms suggestive of sprue or any other disease, and (3) necessity for hospital treatment.

For dietetic treatment the short-term (3 months) results are shown for 52 patients treated initially with diet alone by means of the Napier 3, 4, 5 high-protein low-fat sprue diets ranging from 1,513 to 2,584 Calories and containing

1.2-1.6 mgm. thiamine, 6.0-6.3 mgm. riboflavin 18.3-26.9 mgm. nicotinic acid and 31-43 mgm. ascorbic acid. Thirty-seven patients were evacuated to England after three months treatment, 23 in a state of complete and 14 of partial remission. The remaining 15 failed to respond to treatment.

The long term (2 years) results show that during two years, 29 have been in complete remission, four have periodically developed symptoms and four have definitely relapsed and have been admitted to hospital.

The results of short term (6 months) parenteral therapy were seen in 25 patients 15 who had failed to respond to dietetic treatment and 10 too ill on admission to be treated on diet alone. All these received investigation diets but without foods with possible therapeutic value such as liver, bananas and vitamins. They received parenteral liver over long periods and some were given trials of injections of nicotinic acid and riboflavin for a short time. All were treated for six months before evacuation from India. Ten were in complete remission, 13 in partial, and 2 failed to respond.

Of the 62 patients 69.4 per cent. have remained well for two years in England and 8 per cent. have had mild gastro-intestinal symptoms. 16.1 per cent. have relapsed since leaving hospital in India.

The cyclic evolution of the disease should be appreciated, and a glossitis lasting 2-3 weeks early in remission has an obvious bearing on assessing the efficacy of any therapeutic agent. Liver therapy is dramatic and may be life saving, but has no detectable action during remission.

Of 51 patients treated by diet alone 71 per cent. underwent remission. Fifteen who failed to improve were deprived of liver, bananas, and vitamin extracts for a period up to 17 days without any deterioration in their condition.

In 10 undergoing remission during liver therapy a positive nitrogen balance was found. In one of these a negative nitrogen balance had been present during relapse. During relapse also absorption of fat still remained in the region of 50 per cent. Raising the fat intake from 69 to 96 gm. daily did not alter the percentage absorbed. The evidence of the glucose-tolerance curve is doubtful. This was flat in relapse and remained so for the first two weeks of remission. Nicotinic acid and riboflavin produced no change in fat absorption nor in the clinical state.

In one severe relapse the effect of 10-15 gm. of sodium chloride daily by the mouth was tried for 10 days. Fluid stools rose from 3 to 9 a day weight dropped, anorexia increased and weakness became extreme. Serum sodium rose from 258 mgm. to 310 mgm. per 100 ml.

Sulphaguanidine (as in bacillary dysentery) improved the diarrhoea often within 24 hours. The danger of dehydration was rapidly overcome. As it did not produce remission of symptoms its usefulness lay solely in controlling diarrhoea. The mode of action of liver in sprue is not clear. The extract used was a crude one of Indian manufacture and was equivalent to a standard proprietary preparation as regards haemopoietic activity. Dosage was 10 ml. given intramuscularly each day for 4 days followed by 4 ml. daily for some weeks.

The effects of liver depend on the phase of the sprue cycle. It is active and beneficial in relapse but affords little benefit in remission. The more marked the relapse syndrome the more effective was liver therapy but its action was not proportional to the severity of the anaemia. Gastric hydrochloric acid was increased under liver therapy while the stools, though pale, became normal in number and consistency within 3-7 d. ja. Reticulocytosis was slight (not above 3 per cent.) but the red cell count slowly rose over a period of weeks with steady diminution in the mean corpuscular volume to normal.

The action of liver manifested itself in the gastro-intestinal tract from tongue to colon, producing evidence of increased absorption of water and water

soluble-substances, but no such marked effect was seen in fat absorption. The haemopoietic response was slow and unlike that produced in pernicious anaemia
P Manson-Bahr

HAEMATOLOGY

FONSECA, L C Subnutrição e anemia na região noroeste do estado de São Paulo (Sobre a importância das carências alimentares na patogenia das anemias com especial referência à ancilostomótica) [Malnutrition and Anaemia in the North-Western Region of São Paulo (Brazil) (On the Importance of Dietary Deficiency in the Pathogenesis of Anaemia, with special reference to Hookworm Anaemia)] *Hospital* Rio de Janeiro 1948, Apr, v 33, No 4, 559-610, 6 figs [125 refs]

A haematological investigation was made in 212 unselected recruits from the interior of São Paulo, Brazil. The men were divided into groups, according to their previous dietary background. The results are summarized in the following table —

Diet	No of cases per cent	Mean R B C millions per cmm	Haemoglobin gm /100 ml	Mean Corpuscular Haemoglobin, $\gamma\gamma$
Very good	1	4.64	14.48	31
Good	19.8	4.69	14.62	31
Average	20.2	4.37	13.28	30
Bad	38.2	4.20	12.64	29.7
Very bad	20.8	4.07	11.91	29.2

If anaemia is considered to be present when the red cell count falls below 4 million, or the haemoglobin below 14 gm /100 ml, then 70 per cent of the recruits were anaemic. The incidence in the general population is likely to be even greater, since the group studied was composed of apparently fit young men.

The author goes on to discuss the part played by iron-deficiency and by ankylostomiasis in causing this high incidence of anaemia. He recapitulates in detail the work of W. Oswaldo Cruz, who in 1932 [this *Bulletin*, 1932, v 29, 760] put forward the hypothesis that the essential cause of hookworm anaemia is an inadequate iron intake, and that only a secondary rôle is to be attributed to the blood-sucking activities of the parasite. This view received some support from the findings of RHOADS, CASTLE, PAYNE and LAWSON in Porto Rico [*ibid*, 1935, v 32, 263].

In subsequent papers [*ibid*, 1934, v 31, 797, 1935, v 32, 262, 640] Cruz showed that the so-called hookworm anaemia as seen in Brazil, is intensely microcytic and hypochromic, with an average mean corpuscular volume of 56 μ and a mean corpuscular haemoglobin of 13 $\gamma\gamma$. On treatment with iron alone, without vermifuges, the red cell indices are rapidly restored to normal. This response is accompanied by a reticulocytosis of up to 30 per cent, which may cause a transient macrocytosis [compare LEHMANN, this *Bulletin*, 1949, v 46, 664]. Vermifuges, on the other hand, have quite a different effect: they may cause an increase in the red cell count, but have no effect on the red cell indices, and do not produce signs of blood regeneration.

On Cruz's theory ankylostomiasis is to a large extent irrelevant as a cause of anaemia, such as that found in São Paulo. Fonseca in the main accepts this view. He attaches, however, rather more importance to the hookworm as a cause of blood loss and thereby loses not only of iron but perhaps also of other nutrients, such as vitamins and protein. The paper concludes with an examination of the public health aspects of the problem, and with a plea for more attention to be given to the nutritional status of the Brazilian people.

J. C. Waterlow

PATEL, J. C. & BHEMDE, V. M. "Refined" Liver Extract in Tropical Macrocytic Anaemia. *Blood* 1949 Mar v 4 No. 3, 259-68. [17 refs.]

Forty-five patients with tropical macrocytic anaemia (T.M.A.) were treated with "refined" liver extracts, Anaheamin Examen Reticulogen, and Examen N.P. (new potency). All had a red cell count below 3.0 million per cmm. The patients were in hospital on a milk or vegetable diet.

In four patients on Anaheamin an optimum response was obtained after 2 ml. repeated weekly for 4 weeks, 12 ml. in 8 days, 9 ml. in 10 days and 20 ml. in 10 days, respectively. In one of these cases no response was observed after the first 2 ml.

With Reticulogen, no response was obtained in one case with 4 ml. in 8 days but optimal response in another on 8 ml. in 8 days.

With Examen an optimal response was obtained in a series of cases with divided doses of 8 ml., 12 ml., 14 ml., 14 ml., 22 ml., 22 ml., 26 ml. and 32 ml., a sub-optimal response with 4 ml. (single dose) and no response or poor response to 10 and 20 ml. (divided) but both the latter failed to respond normally to "crude" liver extract.

With Examen N.P., an optimal response was obtained with divided doses of 1 ml., 10 ml., 6 ml. (in 7 cases) and 3 ml. (in 4 cases) and with single doses of 2 ml. (in 5 cases) and 1 ml. (1 case). A sub-optimal response was obtained with 1 ml. (1 case) and 2 ml. (4 cases). No response was obtained with 3 ml., 2 ml., and 5 ml. (in 1 case each) but in the two latter cases no response was obtained with crude liver extract either.

The authors conclude that, as in the case of pernicious anaemia, the response in tropical macrocytic anaemia, or in nutritional macrocytic anaemia of temperate climates, which they consider the same syndrome, to liver extracts

"refined" or "crude" is in proportion to the amount of liver from which the extract was made. But they consider that there is evidence that the newer refined extracts contain some substance that was not included in the earlier preparations, and that this accounts for discrepancies in the observations of some previous workers.

They also conclude "As judged from therapeutic observations it is suggested that in the majority of cases of T.M.A. the deficiency is similar to that in Addisonian pernicious anaemia though the mode of production of the deficiency may not be the same."

L. E. Nafser

SPIES, T. D., GARCIA LOPEZ, G., MILANKS, F., LOPEZ TOCA, R. & ARAMBURG, T. A Note on the Oral versus Parenteral Administration of Vitamin B₁₂. *Southern Med. J.* 1949 June v 42, No. 6 529-31. 2 charts.

The authors refer to their paper on the tentative appraisal of vitamin B₁₂ as a therapeutic agent [this *Bulletin* 1949 v 46, 566]. They confirm their observations on the response to B₁₂ of cases of pernicious anaemia, tropical spore and nutritional macrocytic anaemia (four of each, all in relapse) and they point out that while oral administration is highly satisfactory parenteral

injections will be indicated in many cases. There are advantages in the use of this route in cases where there is severe cardiac failure, severe neurological changes or severe gastro-intestinal disturbances. The patient will absorb the material administered parenterally and a deranged tract cannot act as a block to its absorption.

While there is considerable variation in response, the patients in the authors' group can be said to have taken from 30 to 50 times as much material by mouth as by injection. This amount is reduced to about 5 to 10 times the parenteral dose by the oral administration of an incubated mixture of vitamin B₁₂ and normal human gastric juice. Two patients with pernicious anaemia are referred to who developed "acute combined system disease" after 30 microgrammes of B₁₂ by the mouth when the same quantity was incubated with human gastric juice and given to the patients the blood responded and the "acute signs of combined system disease" disappeared. *H J O'D Burke-Gaffney*

ITANO, H. A. & PAULING, L. **A Rapid Diagnostic Test for Sick Cell Anaemia**
Blood 1949, Jan, v 4, No 1, 66-8 [14 refs]

In sickle-cell anaemia, the erythrocyte maintains its normal shape in the presence of sufficient oxygen, but when the oxygen tension is reduced the haemoglobin aggregates into clumps, the cell membrane collapses, and the erythrocyte takes on an oat or sickle shape.

The authors' method of testing blood for this sickling tendency is based on the fact that sodium dithionite ($\text{Na}_2\text{S}_2\text{O}_4$) reduces oxyhaemoglobin.

The reagent is prepared by adding 0.114 M aqueous sodium phosphate (Na_2HPO_4) to 0.114 M aqueous sodium dithionite until the pH is 6.8, the ratio of the two solutions required for this purpose is about 3 to 2. The reagent should be prepared shortly before use. About 0.05 ml is added to a small drop (about 0.01 ml) of blood on a slide (either oxalated or finger blood) and the mixture is observed under the microscope, or an excess of reagent may be added to a small volume of blood in a test-tube and a drop of the mixture observed under the microscope. The process of sickling may also be followed in a haemocytometer counting chamber by half filling it with a saline suspension of the red cells and then adding the reagent to fill the chamber.

The authors tested the blood in six cases of sickle-cell anaemia and noted characteristic changes. They assume that the sickling will also occur with the blood of a person with the sickle-cell trait only, but their tests in this investigation were confined to cases of declared anaemia. *L. E. Napier*

CORNBLEET, T., SCHORR, H. C. & BARSKY, S. **Pseudo-Ophiasis and Sick Cell Anemia** *Arch. Dermat. & Syph.* 1949, May, v 59, No 5, 519-21

"All 3 patients were male, but their ages ranged from 5 to 25 years. All had severe sickle cell anemia. It appears that the alopecia, once formed, remains indefinitely. It does, however, vary in degree, the variation paralleling the changing severity of the subject's anemia. The alopecia could be thought of as an inverse hippocratic one. It would have been desirable to make a histologic study of material from the scalp, but this material was not forthcoming. The alopecia is apparently not a family characteristic. How it is produced is pure conjecture."

EPIDEMIC DROPSY

SINGH, B. M. A Study of Clinical Features of Acute Cardiac Failure in Epidemic Dropsy. *J Indian Med Ass* 1949 Feb., v 18, No 5 158-60

At Bhaugapur epidemic dropsy occurred in 1939-40 and thereafter sporadic cases only were observed till the beginning of 1947 when they became more frequent and reached an acme in the second quarter of the year. The crop was shown to be mustard oil contaminated by argemone oil. In this short paper particular reference is made to 12 patients (out of 40 studied) who presented symptoms of acute cardiac failure. No organic valvular lesions were detected, no ascites and no cyanosis until just before death—no marked dropsy was present. The condition is very serious, with marked dyspnoea, respirations 50-60 per minute, pulse 120-130—a posture of orthopnoea was preferred although it did not seem to afford any relief. In two patients the attack was brief, lasting 2-4 hours only; in one it lasted for 48 hours—the remaining who died after symptoms increasing in severity. [Nothing is said of the post mortem appearances—perhaps no autopsy was held.] *H Harold Scott*

VENOMS AND ANTIVENENES

CORRILL, N. L. Malnutrition and Snake Poisoning in the Sudan. *Tans. Roy Soc Trop Med & Hyg* 1949 May v 42, No. 6 613-16 1 graph.

The author states that in the Anglo-Egyptian Sudan there are two seasons of the year when human beings suffer from nutrition deficiencies—the early rains (May-July) when milk and green food are scarce and the winter (November to mid-February) when latent deficiencies tend to become overt. The period of heavy rain is July-October.

Snakes are most numerous at the height of the rains and, naturally, cases of snake-bite are then more common, but figures show that fatalities from this cause are more frequent in the dry season when snakes are relatively fewer. It is suggested that—in the dry season persons are in a nutritionally poorer state than they are in the wet season when milk and vegetables are plentiful, and the superimposed snake poisoning—spart from the synergistic haemorrhagic effect of viperine venom with ascorbin deficiency—serves through trauma as a premonitory episode i.e. as a stimulant to katabolism, and thus tends to activate nutrient deficiency conditions thereby increasing the illness of the bitten person.

The common belief in the annual recurrence of symptoms is ascribed analogously to the annual season of deficiency. *H Harold Scott*

TAYLOR, E. H. A Preliminary Account of the Herpetology of the State of San Luis Potosí, México. *Univ Kansas Sci Bull* 1949 Apr 20 v 33, Pt. 1 169-215

ROCHA & SILVA M. BERALDO W. T. & ROSENFELD C. Bradykinin, a Hypotensive and Smooth Muscle Stimulating Factor released from Plasma Globulin by Snake Venoms and by Trypsin. *Amer J Physiol* 1949 Feb. 1 v 158 No. 2, 281-73 8 figs. 31 refs.

"The pseudo-globulin fraction (precipitated by 30 to 45% saturation with ammonium sulphate) of normal plasma contains the precursor (bradykinogen) of a hypotensive and smooth muscle stimulating factor (bradykinin) that can be

released by proteolytic and coagulating venoms of the *Bothrops* genus and by trypsin. If an appropriate dose of the enzyme or the venom is used, the maximum release is observed after 1 to 3 minutes incubation, at 37°. If incubation of the globulin with the venom of *B. jararaca* or trypsin is prolonged for 10 to 20 minutes the released factor is destroyed, this suggests that it has a polypeptide nature or at least a peptide linkage, the integrity of which is necessary for its pharmacological activity.

"Bradykinin is thermostable, dialysable through cellophane, resistant to prolonged boiling in 0.1 to 1 N HCl solution, but rapidly destroyed if heated in an alkaline solution.

"The guinea pig gut is the most sensitive smooth muscle organ assayed and the rat intestine the least so. Doses of bradykinin equivalent to those released from 100 to 200 cc of plasma produce a steady fall in arterial blood pressure of the cat, the rabbit and the dog. The possibility that bradykinin is a mediator in several kinds of shock is discussed."

AHUJA, M. L. & BROOKS, A. G. Detoxification of Krait Venom *in vivo* by means of Carbolle Soap Solution. *Indian J Med Res* 1948, Apr., v 36, No 2, 181-2.

The senior author refers to previous work by himself and BROOKS [this *Bulletin*, 1946, v 43, 478] in India and that of CHRISTENSEN and DE WAAL [*ibid*, 1948, v 45, 108] in South Africa on the protective effect of soap solution in pigeons and guineapigs respectively given certain lethal doses of cobra venom.

The note records the protective effect of soap solution infiltrated into the thigh muscles of guineapigs 1 to 3 minutes after that area had been injected with venom of the common krait (*Bungarus caeruleus*).

A table shows how the survival time was extended by the administration of soap solution after doses of krait venom of 0.06 to 0.02 mgm, compared with corresponding doses when no treatment was given. For example, with 0.02 mgm of venom, 4 guineapigs died in 5 to 8 hours respectively, while with soap treatment and the same dose of venom, 3 out of 4 animals survived and the fourth did not die for 30 hours.

H. J. O'D. Burke-Gaffney

EFRATI, P. Poisoning by Scorpion Stings in Israel. *Amer J Trop Med* 1949, Mar., v 29, No 2, 249-57 [15 refs].

The author has, during the 12 years 1935-1947 seen a large number of cases of scorpion sting, but in 22 only did generalized toxic signs appear and his remarks in this paper are based on these. The common scorpions of Palestine are *Buthus quinquestriatus* (the most poisonous), *Prionurus bicolor*, *Nebo herichonticus*, *Buthus judaicus* and *Scorpio maurus*, one of the patients was stung by *P. crassicauda*, in ten other cases in which the scorpion was identified it proved to be *B. quinquestriatus*, all the severe cases and all that ended fatally were the result of stings by this species. The systemic symptoms which came on 10-20 minutes after the stinging were usually restlessness, laboured respiration, cyanosis, vomiting, flushing of the face, rhinorrhoea, chilliness and tachypnoea, sometimes formication, tachycardia and abdominal pain.

Six of the 22 patients died, serum was obtainable in a few instances only, so treatment was chiefly symptomatic. Five received serum prepared at the Pasteur Institute, Algiers, one died—the amount of serum being insufficient—whereas of 17 who did not receive it 5 died. Atropine and Gynergen [this is not defined] were given to 5 patients, two seemed to improve, but in three no benefit was observed. [Nothing can be inferred from this because many of those stung get well without treatment.]

H. Harold Scott

SERGEANT Et Douze années de sérothérapie antiscorpionnique [Twelve Years Use of Scorpion Antivenin.] *Ann. Inst. Pasteur* 1919 Jan. v 78 No. 1 50-52.

The antivenin used is that prepared by inoculation of horses with the venom or anavenom of *Proxurus australis*, the most toxic of North-African scorpions [see this *Bulletin* 1949 v 48 775]. This is active against the venoms of other scorpions in this district. Thus the author records the case of a boy of 6 years, stung by a *Buthus occidens* as he became comatose in a few minutes but rapidly revived when given a subcutaneous injection of 20 cc. of *P. australis* antivenin. The preparation was made available to medical practitioners in 1936 and in the next 12 years observations had been sent in on 4 057 patients treated by the antivenin. Among these, 1,003 were so serious as, in the opinion of the medical attendants, to threaten life and of these 923 (92 per cent.) recovered. 24 were Europeans, the rest (97.5 per cent.) were indigenous Moslems. H. Harold Scott

DERMATOLOGY AND FUNGUS DISEASES

DOSTROVSKY A. & SACHSE R. Lichen Planus in Subtropical Countries. Study of an Annular Type with Inverse Localization (Uncovered Surfaces of the Skin). *Arch. Dermat. & Syph.* 1949 Mar v 59 No. 3, 308-28. 3 figs. [Refs. in footnotes.]

During the years 1930 to 1946 a total of 131 cases of lichen planus were treated at the outpatient department of the Rothschild-Hadassah University Hospital, Jerusalem. This figure represents approximately 0.2 per cent of all patients with dermatological disease.

In 51 cases a special type of lichen planus was observed. Morphologically this appeared in an annular pattern mainly confined to the exposed parts. The eruption had a special predilection for the lower age groups, and affected particularly persons of dark complexion coming from subtropical countries. It differed from classical lichen planus in that itching was almost entirely absent. The onset was seasonal with recurrences or spreading in spring and summer and improvement in the rainy season. It ran a longer course than classical lichen planus, and usually lasted several years. Grenz rays were used in the treatment of 18 patients, in 10 of these the lesions disappeared, and in 3 there was some improvement. H. T. H. Wilson

LIMA TORRES, A. Treponemose discrômica. Puntá-puntá, mal de ponta. (Dyschromic Treponematosis. Mal del Pinta.) *Rev. Brasileira Med.* Rio de Janeiro 1949 Feb., v 6 No. 2, 111. 1 chart. [3 refs.]

This paper was presented for reading to the Public Health Society of Brazil. It covers the subject of pinta generally, with many quotations from or allusions to the literature of the disease. The author proposes the name of *dyschromic treponematosis* caused by *Treponema carateum* and L. divides his essay into three parts: epidemiology, prophylaxis and legislation. Much of it is text book knowledge today. He starts with a list of the synonyms in Brazil, Colombia, Mexico, Haiti and elsewhere and follows this with a definition of the disease and a sketch of the history of the discovery of the cause from the early "mycotic" days to the later spirochaete and the various names given to the organism: *T. carateum*, *T. kerreyi*, *T. americanum*, *T. f. disc.*, *T. f. pinta* and *T. dyschromoderma*, deciding that the first is the correct one given by

Brumpt in 1930 The geographical distribution and transmission are next dealt with Modes of transmission referred to are 1 Direct, by contact 2 Indirect by (i) vectors, *Hippelates* and *Simulium*, (ii) Ritual means, mutual flagellation, the whips being contaminated by the blood of some infective person transferred to the wounds of a non-infected, (iii) Criminal [surely unlikely] where "rowers and interpreters" who object to newcomers inoculate the latter with infective blood or give them such blood mingled with their food, when their mouths are sore from eating some irritating food, (iv) Other modes mentioned are infection of an infant by its mother's milk, and transmission by blood-transfusion Hereditary transmission is also mentioned, but the author states that the evidence for this is lacking

The section on Prophylaxis contains nothing fresh, it includes search for cases, diagnosis by serum reactions and finding the organism, treatment by mercury, arsenicals and penicillin, and protection of the healthy by good sanitation, healthier and better dwellings and propaganda work by instituting sanitation posts for the treatment of patients by spreading information about the disease and educating the people The third section on Legislation is closely connected with the second and includes penalties for violation of the rules of hygiene

H Harold Scott

MOREAU, M H Un caso de pie de Mádura [A Case of Madura Foot] *Prensa Méd Argentina* 1949, Feb 4, v 36, No 5, 230-32, 4 figs

BRAS, G, RIJKEBÜSCH, Liesbeth, KOTTER, G F & HAM D L Een klinische, pathologische en mycologische waarneming bij Histoplasmose [Clinical, Pathological and Mycological Observations on Histoplasmosis] *Med Maandblad Batavia* 1949, May 1, v 2, No 5, 146-52, 8 figs on 2 pls [36 refs] English summary

A fatal case in a Chinese in Batavia, with general clinical and pathological observations

CANCELA FREIJO J Histoplasmosis de Darling Segundo caso observado en el Uruguay [A Second Case of Histoplasmosis observed in Uruguay] *Hoja Tisiológica*. Montevideo 1947, Sept, v 7, No 3, 207-11, 7 figs

Report of a case in Montevideo

CAMPBELL, Charlotte C & SASLAW, S Use of Yeast-phase Antigens in a Complement Fixation Test for Histoplasmosis. III Preliminary Results with Human Sera. *Pub Health Rep Wash* 1949, May 6, v 64, No 18, 551-60 [11 refs]

In a previous paper by these authors [this *Bulletin*, 1949, v 46, 83] on the complement-fixation reaction with anti-*Histoplasma* rabbit serum and various forms of *Histoplasma* antigen, it was shown that the most suitable antigen for the test was a suspension of the ground-up yeast-like form of the fungus This kind of antigen was therefore used in the complement-fixation tests with human serum which were designed to determine the probable value of the complement-fixation reaction in the serological diagnosis of histoplasmosis, to find if the degree of dermal sensitivity to histoplasmin was proportionate to the titre of complement-fixing serum antibody, and to determine to what extent the specific value of the complement-fixation test for the diagnosis of histoplasmosis was vitiated by cross reactions with the antigens of *Blastomyces dermatitidis*

In three cases of acute histoplasmosis the serum titres for complement-fixation ranged from 1:330 to 1:1,280 but as the disease progressed towards the chronic stage these titres declined and approached the level of those given by normal sera.

Of the normal sera examined, 40 per cent. gave complement-fixation in titre from 1:10 to 1:40. Low titre complement fixation was given by the sera of 10 out of 73 persons who were histoplasmin-positive and by 6 out of 131 who were histoplasmin-negative. It was found that the proportion of apparently non-specific serum reactions was greatly reduced by allowing only 4 hours instead of the customary 18 hours for antibody-antigen combination in the cold before adding the complement. Cross reactions with *Blasowrites* antigens occurred and, as previously observed, they were more marked between anti-*Histoplasma* serum and *Blasowrites* antigen than between anti-*Blasowrites* serum (which was invariably of low antibody content) and *Histoplasma* antigen.

From the results quoted, the authors concluded that the potential value of the complement-fixation test as an aid in the diagnosis of histoplasmosis has been demonstrated.

J. T. Duncan

SASLAW S. & CAMPBELL, Charlotte C. A Colloidal Agglutination Test for Histoplasmosis. *Lab Health Rpt* Wash. 1949 Apr 1 v 61 No. 13 421-8

In an earlier paper SASLAW & CAMPBELL (this *Bulletin* 1949 v 46, 779) described the reaction of agglutination by anti-histoplasma serum, of a suspension of colloidal particles sensitized with the soluble antigens of *Histoplasma capsulatum*. The present report deals with the application of this serological reaction as a diagnostic test for human histoplasmosis.

The sera of 197 healthy persons 71 of whom were histoplasmin-positive, were tested with the sensitized suspension and 60 were found to cause relatively weak agglutination. Of these 60 25 were in the histoplasmin-positive group and 35 in the histoplasmin-negative group. So the apparently non-specific agglutination reaction was not related to dermal sensitivity to histoplasmin.

Tests with sera from six proved cases of histoplasmosis showed three all from chronic stages of the disease to possess weak agglutinating power similar to that of the normal sera, but the remaining three all from acute disease showed much stronger reactions and higher agglutinin titres. With these six human sera, the results of the colloidal agglutination tests were closely correlated to those of specific complement fixation tests, and it was felt that further research may show that the agglutination of sensitized colloidal particles constitutes a simple and useful diagnostic test in histoplasmosis.

J. T. Duncan

FIRSTSTONE G. M. & BEYRON E. S. Coexisting Disseminated Coccidioidomycosis and Tuberculosis. *Am J Rpt Tuberculosis*. 1949 Apr v 59 No. 4 415-23, 4 figs. [11 refs.]

A case of disseminated coccidioidomycosis which lasted for six years and was complicated by active tuberculosis is presented. The two diseases seemed to occur coincidentally the individual coccidioidal granulomas being devoid of acid-fast bacilli, and the tubercles containing only a few *Coccidioides* sporoblasts at the periphery. The coccidioidomycosis terminated in a miliary dissemination throughout the body including the brain and prostate, as well as the more usual sites but did not involve the bowel or renal pelvis. The tuberculosis presented a definite secondary or adult type of distribution in the lungs, pharynx, and bowel, as well as a hematogenous dissemination to the serosal vesicles.

"Streptomycin was of definite value in controlling the tuberculosis but did not affect the coccidioidomycosis, whereas potassium iodide and vitamin D₂ in massive doses seemed to decrease some manifestations of the coccidioidomycosis. It is suggested that the latter drugs be given further trial in cutaneous coccidioidomycosis."

HEAT STROKE AND ALLIED CONDITIONS

LADELL, W S S The Effect of Pituitrin upon Performance in Moderate Heat
South African J Med Sci 1948, Oct, v 13, No 4, 145-50, 1 fig

During work in humid heat there is probably some release of anti-diuretic principle from the pituitary, and this paper reports preliminary observations on the effect of pituitrin on performance in the heat. The subjects were eight young African medical students, none of whom had been outside Nigeria. The experimental room was maintained at about 88°F dry-bulb and 83°F wet-bulb, with calm air. In each experiment there were four 30-min spells of step-climbing on to a stool 1 ft high 24 times a minute, with 15-minute intervals of rest. Weighings were done, and sweat losses thus ascertained.

Each subject was tested four times, twice without and twice with pituitrin (5 units given subcutaneously). The pituitrin decreased the sweat production of the heavy sweaters and increased that of the light sweaters so that after pituitrin the two groups lost similar amounts of sweat.

This statistically significant difference could not be accounted for with any certainty, but there is a very brief discussion of a possible explanation.

Thomas Bedford

MISCELLANEOUS DISEASES

LÖFFLER, W, ESSELIER, A F & MACEDO, M M Sobre a patogenia e etiologia do infiltrado pulmonar fugaz com eosinofilia sanguínea (Síndrome de Loeffler)
[The Pathogeny and Aetiology of Loeffler's Syndrome] *Gaz Méd Portuguesa* 1949, v 2, No 1, 1-16, 10 figs (8 coloured) & 1 folding chart [15 refs]
English summary

The coincident presence of eosinophilia and transient pulmonary infiltration has been accounted for in various ways. The authors have shown by experiments on guinea-pigs, infesting them with larva-containing ova of *Ascaris lumbricoides*, that the results were patches of atelectasis, and evanescent pulmonary changes with eosinophilia, and by sacrificing the animals at intervals he has demonstrated the larvae and eosinophilia in the lungs. The coloured plates of the stained sections are particularly good. [This article cannot be said to add very much to our knowledge of Loeffler's syndrome. All that the authors have shown is that *Ascaris* larvae in passing through the lungs set up transitory changes there associated with eosinophilia—facts well known in the life-history of this helminth.]

H Harold Scott

JAFFÉ L. Scleroma (Rhinoscleroma). *Trans Roy Soc. Trop Med & Hyg* 1949 May v 42, No. 6 617-19 [11 refs.]

The author writing from Almirante, Panama, prefers the less restricted term scleroma to that of rhinoscleroma because the disease is by no means limited to the nose. The case here described supports his view. The patient was a man of 24 years whose nostrils were almost closed by crusted scar like tissue with granulations on the right vocal cord and thickening of the subglottic mucosa. The report by the pathologist on tissue from the nostrils was that it was a typical rhinoscleroma. Treatment by sulphathiazole was tried, then by iodadin (reprodal) intramuscularly and tartar emetic intravenously and surgical symptomatic local measures but with little and not lasting benefit. After 15 months of this he is to apply elsewhere for X-ray or radium treatment.

Rhinoscleroma is believed by some to have autochthonous foci only in Central America, Sumatra, and in South-eastern Europe in Volhynia and Galicia. It is, however not uncommon in Guatemala and El Salvador and the author saw cases of it in Honduras. The results of the various forms of treatment suggested and tried are variable and uncertain.

II Harad Seed

DE LA RIVA, G. E. Contribution to the Study of Tropical Eosinophilia. *Southern Med. J.* 1949 May v 42, No 5 429-34 [27 refs.]

Early in 1949 an epidemic of fever and eosinophilia involving about 300 cases occurred in Pinar del Rio in the Western province of Cuba. Writing from Havana, the author describes his investigations on a group of 43 of these cases. Thirty-one of them he regarded as parasitic infections with no positive findings except for a moderate eosinophilia. These recovered completely after parasiticidal therapy. Eight cases were regarded as examples of Loeffler's syndrome on account of their marked pulmonary consolidations, high eosinophilia, and rapid recovery. The remaining four cases in this group were regarded by the author as examples of tropical eosinophilia. All four showed asthmatic symptoms, leucocytosis and eosinophilia, and in all cercariae of *Fasciola hepatica* were isolated from bile samples. Three other cases exhibiting respiratory symptoms and a high degree of eosinophilia were also regarded by the author as classical examples of tropical eosinophilia. Surgical removal of a congenitally atrophic testicle in the first case of retained products of conception in the second, and of a dermoid cyst in the third was followed by complete recovery in each case. The author accordingly is of the opinion that tropical eosinophilia is not a specific disease but is an allergic response of an organism to embryonic elements of any nature which act as allergens with specific antibody production.

[The author has demonstrated that respiratory dyspnoea and eosinophilia may follow a variety of causes. In each of the seven cases which he describes a reasonable explanation is given to account for the symptoms and the eosinophilia. It is therefore doubtful whether these cases are identical with those described by WEINGARTEN this Bulletin 1943 v 40 407] and subsequent writers who have failed to demonstrate similar findings after investigating a very large number of cases of classical tropical eosinophilia.

II T H W 109

WEINGARTEN J. G. RUBLEY LILLIAN & DIXON C. D. Tropical Eosinophilia. *Bull U.S. Army Med Dept* 1949 June, 9 v 6 477-63 2 figs. [10 refs in footnotes.]

Report of a case in a U.S. soldier from Korea

RIGBY, E P A Case of Secondary Thrombocytopoenia resembling Onyala.
East African Med J 1949, Apr, v 26, No 4, 84-6

Onyala has rarely been reported from East Africa, and only once from Kenya (WELCH, *J. Trop Med & Hyg*, 1920, v 23, 138) The case described below was probably of secondary origin

The patient, an adult Meru male, was admitted to hospital with a swollen and painful right knee Kahn test on 18th October 1948 showed +++ Three injections of bismuth [preparation and dose not stated] were given, but this was stopped owing to development of a mild gingivitis Subsequently four injections of 0.45 gm arsphenamine were given, the last on 25th November 1948 On 1st December the patient began to bleed from the gums, which showed no sponginess, but two haemorrhagic bullae were found on the tongue, one on the dorsum and one underneath On 3rd December he was still bleeding and a third bulla, showing umbilication, had developed on the lower lip Two ampoules of Planavit were given and three injections of the patient's own citrated whole blood, two of 20 ml and one of 16 ml, were administered intramuscularly Bleeding finally ceased on 5th December when the red cell count was 3,830,000 per cmm, the bleeding did not recur A successful platelet count was not done

On 19th January 1949 the Kahn test was negative and on 27th January an injection of 0.3 gm of arsphenamine was given without recurrence of the bleeding

This is the first time that the author has seen an onyala type of disease associated with the administration of arsenicals GELFAND [this *Bulletin*, 1949, v 46, 573] points out that this condition is found only in certain Bantu tribes, and the author suggests that its occurrence may be due to a personal idiosyncrasy, tribal in extent The patient was of the same tribe as the only case previously reported in Kenya by Welch

[Probably some cases are missed or confused with other diseases]

C F Shelton

HUGHES, M A Case of Thromboangitis Obliterans in an African Woman
Trans Roy Soc Trop Med & Hyg 1949, May, v 42, No 6, 621-2 [10 refs]

Thrombo-angitis obliterans (Buerger's disease) is very uncommon in women, and the author has not been able to find any record of its occurrence in a negress He now reports a case in an African woman of the Northern Territories of the Gold Coast, a heavy tobacco smoker who also chewed tobacco, who came to hospital for treatment for a chronic ulcer of the foot Signs of gangrene appeared after local operation, and the author eventually amputated the limb 10 inches below the anterior superior iliac spine The stump healed by first intention, and the patient, previously in bad condition, immediately and dramatically improved

Pathological examination of the limb showed appearances typical of Buerger's disease, the association with tobacco is noted No Kahn test was done, but had it been positive it might have been the result of yaws

Charles Wilcocks

DAVIES, J N P Pathology of Central African Natives. Mulago Hospital Post Mortem Studies, X *East African Med J* 1949, Apr, v 26, No 4, 76-83 [10 refs]

The author groups renal disease into two main groups (1) those in which there is a gross alteration in the anatomy of the kidney, e.g. hydronephrosis, (1957)

tumour, etc. (2) those terminating in a granular scarred kidney *etc* containing cysts, and generally referred to as nephritis. Renal affections due to bilharzia are uncommon in Kampala, Uganda, unlike GELFAND's experience in Rhodesia. The clinical assessment of nephritis is most difficult; malnutrition oedema is common and can closely simulate a nephrotic syndrome. At autopsy the picture is often obscured by other lesions while the microscopic diagnosis is difficult. Nearly every kidney removed shows hyalinized glomeruli, even in the case of young children, but the incidence of arteriosclerotic nephritis appears low.

Of 2,994 autopsies at Mulago 301 cases were diagnosed as having some form of nephritis, of which 210 were put down as "unclassified," this group being made up of those where no histological examination was made and of those where signs both of diffuse glomerulotubular nephritis and proliferative glomerulitis were found. The majority of deaths occur in the younger age groups, and the commonest immediate causes of death in Africans w. nephritis were supervening infections, especially pneumonia. Very little is known about this condition in Africans, and, with the exception of HENNESSY's work in 1939 (this *Bulletin* 1939 v 36, 949) no detailed investigation appears to have been carried out.

Abnormalities of the kidney were studied at 3,375 autopsies. Primary renal agenesis is a very rare condition and no bilateral cases have been seen. There were only 4 cases of unilateral agenesis and dwarfed kidney and these lesions are less common in Africans than in Caucasians. Horseshoe kidney was found 3 times and in one such case numerous renal calculi were present. Solitary cysts were seen twice. No cases of bilharzial urinary infection were seen. In Uganda far the commonest cause of obstruction in the urinary tract is urethral stricture. Renal calculus is uncommon in Africans (at Mulago 11 cases in 2,294 autopsies). The commonest renal tumour was a secondary lymphosarcoma.

The commonest bladder condition was cystitis with hypertrophy due to gonococcal stricture. Tumours of the bladder and prostate have been discussed in a previous paper in the series. It is noted that the problem of urethral stricture is an immense one and treatment difficult as patients come late for treatment when infective and obstructive symptoms are usually well-established. Uro-genital tuberculosis of the fibro-caseous type is uncommon and renal tuberculosis almost always of the military type. C. F. SKELTON

GREENWALD I. The History of Gaitre in Africa. *Bull. H. story of Med.* 1949 Mar-Apr v 23 No. 2, 135-85 [Bibliography]

PROTOZOOLOGY GENERAL

HELLBRÖGGE, T. Ueber Toxoplasmosen. [On Toxoplasmosis.] *Deut. med. Woch.* 1949 Apr 1 v 74 No. 13 385-9 4 figs. [7 refs.]

The author describes a case with symptoms of toxoplasmosis in a child who was under his care in Munich. The account is preceded by a lengthy review of the present state of our knowledge of this disease and of the parasite.

When admitted to the hospital, the patient, a child 3½ years old, showed signs of post-encephalitis, being mentally and physically underdeveloped, with diarrhoea. X-ray examination of the cranium revealed two calcified spots while examination of the eyes showed the characteristic lesions of chororetinitis.

pigmentosa The condition was thought to be congenital toxoplasmosis, the diagnosis of which was supported by a positive neutralization test with the child's serum, while the results of a similar test with the mother's serum were less pronounced Since the mother has been breeding rabbits for some years, it is thought that she contracted the infection from them, transmitting it to the child during its foetal development
C A Hoare

EDMONDS, A R Human Toxoplasmosis, with Report of a Case *Med J Australia* 1949, Apr 2, v 1, No 14, 456-7

A fatal case in a female infant in Perth, Australia

BLANC, G & HINTERMANN, J Un cas de toxoplasmose canine observé au Maroc Grande réceptivité du *Xerus getulus* à l'infection expérimentale [A Case of Canine Toxoplasmosis in Morocco High Susceptibility of *Xerus getulus* to Experimental Infection] *Arch Inst Pasteur du Maroc* 1949, v 3, No 10, 618-21 [14 refs]

LANGHAM, R F Canine Toxoplasmosis *Amer J Path* 1949, May, v 25, No 3, 569-73, 4 figs on pl

"An acutely fatal disease in a dog was characterized by pneumonitis, gastric and intestinal ulcers, and foci of hepatic necrosis The parasites found in the microscopic sections had the structure and distribution described for *Toxoplasma cunicula*"

DE RODANICHE, Enid & DE PINZON, Teresina Spontaneous Toxoplasmosis in the Guinea-Pig in Panama *J Parasitology* 1949, Apr, v 35, No 2, 152-4, 6 figs on pl [12 refs]

"Spontaneous infection with toxoplasma was observed in guinea-pigs purchased in the suburbs of the city of Panama, and representing stock established in this area and without contact with recently imported members of their species"

EICHENWALD, H Experimental Toxoplasmosis II Effect of Sulfadiazine and Antiserum on Congenital Toxoplasmosis in Mice *Proc Soc Exper Biol & Med* 1949, May, v 71, No 1, 45-9 [15 refs]

"The effect of sulfadiazine, antiserum and a combination of these two materials on the course of congenital toxoplasmosis in mice was determined It was shown that while sulfadiazine and antiserum individually had some beneficial action, a combination of these substances was considerably more effective than either used alone"

ENTOMOLOGY AND INSECTICIDES GENERAL

ZUMPT, F Medical and Veterinary Importance of Horse-Flies *South African Med J* 1949, May 7, v 23, No 19, 359-62 [37 refs]

The author, reviewing the literature on the rôle of *Tabanus*, *Haematopota* and *Chrysops* as vectors of disease expresses the view that their capacity to disseminate certain disease organisms to man and animals, particularly mechanically as a result of interrupted feeding, has been underestimated in the past. In

this light, the literature on the mechanical transmission of trypanosomes (*Trypanosoma cruzi* *T. brucei* *T. vivax* and *T. congolense*) anthrax, tularemia, hemorrhagic septicaemia of buffaloes in the Dutch East Indies, amphisomus and infectious anaemia (swamp fever) of horses, is discussed and a plea is put forward for further study on the epidemiological importance of Tabanids (and of *Stomoxys*) in the spread of these diseases. D. S. Bertram

MATTEINGLY P. F. Notes on a Collection of Mosquitoes (Diptera: Culicidae) from Ruanda Urundi. *Ann. Soc. Belg. de Méd. Trop.* 1949 Mar 31 v 29, No. 1 29-35.

A list is given of 11 species of anopheline and of 32 culicine mosquitoes collected in Ruanda-Urundi during July to September 1948. A detailed locality list is also given. Two species not hitherto recorded from this territory are *Anopheles durali* and *Culex cinereus*. H. S. Leeson

VAN DER KUYP E. Annotated List of Mosquitoes of the Netherlands Antilles including French St. Martin with a Note on *Eristosoma maculata* in Curaçao and Bonaire. *Documenta Neerlandica et Indonesica de Morbis Tropici.* Amsterdam, 1949 Mar v 1 No 1 69-70.

"Sixteen species of mosquitoes of which one is an *Anopheles*, and *Eristosoma maculata* Erichson are reported from the Netherlands Antilles also 4 species of mosquitoes from French St. Martin."

SERREYET G. GAUD, J. & MILLET A. Validité de l'espèce *Culex mauritanicus* Coquil. 1940. [Validity of the Species *Culex mauritanicus* Coquil, 1940.] *A n. Inst. Pasteur d'Algérie*, 1949 Mar v 27 No. 1 42 7 1 fig.

SERREYET G. Le genre *Culex* en Afrique du Nord. 2. Les armures génitales mâles. [The Genus *Culex* in North Africa. 2. Male Hypopygia.] *Arch. Inst. Pasteur d'Algérie* 1949 Mar., v 27 No. 1 48-63 9 figs. [11 refs.]

The male hypopygia are described and illustrated of thirteen species of mosquitoes of the genus *Culex* occurring in North Africa. A key based on these characters is given for their identification. H. S. Leeson

SARROCKY C. W. On the Distribution and Correct Name of *Oscinis palispyi*, the Swarming Gnat of the Cedar. *Bull. Entom. Res.* 1949 May v 40 Pl. 1, 61-2.

TURNER D. C., Jr. MURKINMAN J. A. & TURNER ERNESTINE B. Occurrence of *Phlebotomus* (*Aophlebotomus*) *sh. nov.* Dyar in Florida (Diptera, Psychodidae). *J. Parasitology* 1949 Apr v 35, No 2, 199-200.

VARGAS, L. & DIAZ NÁJERA, A. Nuevas especies de mosquitos de México y consideraciones diversas sobre especies ya descritas. [Observations on New Species of Mosquitoes in Mexico.] *Rev. Inst. Salubridad y E. fermentado Trop. Mexico*, 1949, Dec v 9 No 4 331-69 63 figs on 12 pls.

DELLEY L. P. Révision par des voies expérimentales de genre *Hyalomma* C. L. Koch 1844 (2^e partie). [Experimental Revision of the Genus *Hyalomma*.] *Ann. Parasit. Humaine et Comparée* 1949 v 21 Nos 1/2, 87-109 2 pls [12 refs.]

[See this Bulletin, 1948, v 43 1085]

WYGOZINSKY, P. Elenco sistematico de los Reduviiformes americanos [Systematic Index of American Reduviid Forms] *Universidad Nacional de Tucuman Instituto de Medicina Regional Publicación No 473* 1949, Feb, Monografía No 1 102 pp [Bibliography]

This includes lists of Triatomids of medical importance

JENKINS, D W Trombiculid Mites affecting Man III *Trombicula (Eutrombicula) splendens* Ewing in North America *J Parasitology* 1949, Apr, v 35, No 2, 201-3, 4 figs on pl

The trombiculid larvae causing trombidiosis in North America are *Trombicula alfreddugesi* and *T splendens*, and in the tropical and sub-tropical areas of the United States *T batatas* and *T alfreddugesi tropica* are also of local importance The adults of *T splendens* were first described in 1913, but until the present work was undertaken the larval form had not been related to the adult The author shows, by breeding out material, that the trombiculid larva formerly known as *Acariscus masoni* is indistinguishable from the larva obtained from *T splendens* adults

D S Bertram

DE MEILLON, B Eradication of the Vectors of Insect-borne Diseases of Man *J Roy San Inst* 1949, May, v 69, No 3, 177-83

An informative review including Brazil, Egypt, Cyprus, Sardinia and Kenya

PIEDROLA GIL, G Las modernas series de insecticidas y ahuyentadores Revisión de conjunto [Review of Modern Insecticides and Repellents] *Med Colonial* Madrid 1949, May 1, v 13, No 5, 362-82 [21 refs]

A general review

CHOPRA, B L DDT An Ideal Insecticide and Larvicide *Indian Med Gaz* 1949, Mar, v 84, No 3, 111-13

A short general review of nature and special application of DDT

JOHNSTONE, H F, WINSCH, W E & SMITH, L W The Dispersion and Deposition of Aerosols *Chem Reviews* 1949, Apr, v 44, No 2, 353-71, 8 figs

[This paper is entirely theoretical and highly mathematical it presents no new data but compares some conclusions with data of other workers]

From certain assumptions on the conditions governing deposition of aerosol particles out of doors, some predictions can be made about the optimum particle size for various purposes For example, when aerosol falls down through foliage while there is a gentle cross-wind, less of the larger particles will be impacted on leaves than the smaller particles On the other hand, if the aerosol is thrust down by a downdraught from the aeroplane, the opposite is true

For aerosols in confined spaces it can be calculated that there is an optimum particle size for producing various percentages of mortality The relations between particle size and wind velocity and mortality are also discussed, and the theoretical relationship is shown to agree well with experimental results obtained elsewhere

J R Busvine

LA MER, V K & HOCHBERG, S The Laws of Deposition and the Effectiveness of Insecticidal Aerosols *Chem Reviews* 1949, Apr, v 44, No 2, 341-52, 5 figs [15 refs]

Laboratory experiments were done with an apparatus designed to give aerosol particles of constant, determinable size The relation of particle diameter to insecticidal action was assessed by the concentration-time product for

exposures of mosquitoes to DDT aerosols. It was shown that the logarithm of this function is inversely proportional to the logarithm of the droplet radius (over the range 0.3 to 5 microns). In some tests with a wind tunnel, mosquitoes in cages were exposed to aerosols drawn past them at different speeds. The quantity of DDT per area of cross-section of the tunnel, necessary to give 99 per cent. kill of *Aedes aegypti* was determined for various combinations of particle size and wind velocity. The logarithm of this quantity was found to be inversely proportional to the logarithm of the product of the square of the diameter and the wind velocity.

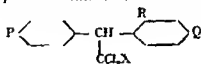
This is due to the mosquitoes picking up more and more poison as the wind velocity increases and also as the diameter (and therefore liability to impaction) of the particles increases. The relationship falls off above a certain point where the mosquito begins to pick up all the particles approaching it in its area of cross section. This value appears to be about 700 micron-miles per hour which indicates an optimum particle size of 10 microns. [Apparently assume, an air velocity of 7 m.p.h.].

In outdoor use the logarithm of the quantity of aerosol falling on standard areas is shown to be inversely proportional to the distance away from the point of generation. Some practical examples are quoted, in which a mobile generator was used, to show that adequate kills of larvae and adult mosquitoes in different areas up to 800 or 1 000 yards away can be achieved by output of an aerosol at the rate of 34 lb. DDT per mile provided that correct particle size is chosen.

J. R. BURTON

PEFFLY R. L. & GAHAN J. B. Residual Toxicity of DDT Analogs and related Chlorinated Hydrocarbons to House Flies and Mosquitoes. *J. Econom. Entomol.* 1949 Feb. v 42, No. 1 113-16.

Laboratory tests were done to determine the toxicity to *Aedes aegypti* and to *Musca domestica* of a number of DDT analogues used as residual insecticides. Several of the best were used for extended tests though none of them was as good as DDT. One of the best samples was DDT by product oils, a mixture of unknown composition. Other comparative results may be indicated by a key as follows. A=best persistent action B C D=least efficient. Thus —



Where —				Known as	Effective grade against	
R	Q	P	X		<i>Aedes</i>	<i>Musca</i>
H	Cl	Cl	Cl	DDT	A	A
Cl	H	Cl	Cl	O-p-DDT	C	D
H	Cl	Cl	H	DDD	C	C
H	F	F	Cl	fluoro-DDT	C	D
H	Br	Br	Cl	bromo-DDT	D	B
H	CH ₃ O	CH ₃ O	Cl	methoxy-DDT	B	C
H	CH ₃	Cl	Cl	—	B	C
H	H	Cl	Cl	—	B	D

[This code is assessed by percentage kills, given after various intervals in the authors' tables.]

J. R. B. MARR

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE [WIGGLESWORTH, A.,
Chairman] LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE
Information and Advisory Service 1949, May, No 1, 12 pp **Residual
Insecticides**

This is the first of a series of Bulletins to be issued by the Ross Institute Industrial Advisory Committee

In a foreword to the Bulletin by the Organizing Secretary, it is stated that the bulletins will deal with one or two important subjects and also will contain news and comments by the Director on the latest developments in tropical medicine and recent activities of the Ross Institute. Usually the main subject will be one of those diseases which are important in the daily work of the planter or miner.

This number deals with residual insecticides, their nature, use, indications and economics. In brief but adequate form, and yet with considerable practical detail, the subject is dealt with in a manner which gives a wealth of information which the intelligent layman will be able to grasp and pursue with ease. DDT and benzene hexachloride are dealt with separately and they are described effectively for the purpose for which the Bulletin is intended.

This series of Bulletins, having the weight of authority and the reputation of the Ross Institute behind them, should prove to be invaluable for those engaged in industry and management in the tropics.

H J O'D Burke-Gaffney

MACGREGOR, R B **Medical History of the War in Malaya** *Med J Malaya*
1949, Mar, v 3, No 3, 145-72

This is a graphic account of the medical situation in Malaya from the beginning, in 1939, of serious preparations to resist invasion, up to the re-occupation in 1945. It is compiled from the reports of many medical officers and traces the story of medical services during the war, retreat, and siege, the decay of Public Health services during the Japanese occupation and the eventful history of the civilian internees. Many of the purely medical details, particularly in regard to nutrition, have already received notice in this *Bulletin*. As a vivid and entirely unbiased description of this unhappy phase of Malaya's history it will be read with the greatest interest.

Dean A Smith

HANCE, B **The Development of Western Medicine in India** *J Trop Med
& Hyg* 1949, Apr, v 52, No 4, 79-82

The history of western medicine in India goes back to the Islamic conquest which spread from Persia to India, and brought the teachings of the great Arab physicians to displace the Ayurvedic system. The latter, though at its zenith (7th-5th centuries B C) it was based upon observation and experiment, had long been decadent when the Islamic invasion took place, but the new system in its turn fell into a decline. The first European physician known to have practised in India was a Portuguese who lived in Goa, where he published a book in 1563. Sir Bennett Hance records the outstanding events in the Medical history of India since that time, in so far as they relate to the development of western medical ideas there, in this short paper, which should be read in full.

The effort expended during the past hundred years or so to educate Indians in medicine has been impressive, and there are now 19 medical colleges teaching to degree standard, and 19 medical schools of licentiate standard. Together

An account is given of occult malaria in which there is a lack of obvious malaria symptoms. Occult malaria is more common in children than in adults and prodromal symptoms, which are common in adults may be missed in children partly because they are subjective and may not therefore come to the notice of the doctor.

There is an interesting discussion on the history of congenital malaria and malaria in very young infants. The diagnosis of congenital malaria can be made only when the disease occurs in conditions in which infection by mosquitoes is impossible. In over ten years the author has had 14 cases in which the diagnosis of congenital malaria has been made with confidence these cases occurred in over 200 000 patients. The possibility of the appearance of congenital malaria, however must not be overlooked and the physician should carefully enquire about the malarial history of the mother. Accounts of cases are quoted, some of which occurred in children born during the malaria free months in Ankara. It is recommended that in special cases drug prophylaxis should be carried out in malarial areas of Turkey during pregnancy. The author says that this is recommended not only in the hope of reducing the number of congenital cases but also the number of abortions which may themselves be due to the much greater frequency of infection in the foetus than is realized. Atebrin is the drug of choice.

Malaria in sucklings and very young children needs considerable attention. Typical rigors do not occur in sucklings, but they have as their equivalent "fever cramps" which of course are not uncommon in other diseases. Temperatures are often low in comparison with the fevers of other diseases. On the other hand, especially in river malaria, enlargement of the spleen occurs rapidly. Temperature charts are not usually characteristic of malaria at this age. In fact if the doctor is presented with a low fever in a sick child he should automatically think of malaria. There is a discussion on the various forms of fever which develop in this age group.

A particularly common characteristic of malaria in sucklings, which is also common in the young age group is dyspepsia and enteritis. Such malarial intestinal disturbances represent a considerable percentage of so-called summer diarrhoeas in children. In these cases parasites will be found in the blood and there will be a specific response to anti-malarial drugs. Both acute and subacute forms exist. A case is described of a child aged six months, admitted to hospital because of severe diarrhoea which had been going on for some days. The child had been raised exclusively on the breast. Until four weeks before admission it was in good health and going well. Since then it had become restless, was crying, sweating and suffering from loss of appetite and ceaseless diarrhoea. On examination the child was in fairly good condition, spleen one finger below the rib margin, temperature 37.9 C. and P. *trix* was present in the blood. On the third day of atebrin treatment the diarrhoea stopped.

A further interesting case is that of a child one and a half years old who was ill for months with diarrhoea: the stools, which were sometimes watery containing blood and mucus. On admission the temperature was 38.4 C., the spleen was just palpable below the costal margin. The patient was treated with anti-dysenteric serum glucose infusions bacteriophage and control of the diet. The diarrhoea responded, but began again on the tenth day with the passage of much blood. No organisms were found in the stools, but on the sixteenth day P. *trix* was discovered in the blood. After antimalarial treatment the temperature fell to normal and quick recovery from diarrhoea took place.

The examples quoted are only a few of many cases which indicate that the children's doctor in endemic area should be aware that enteritis in sucklings

and young children may result from malaria. In the treatment of such conditions the author recommends the parenteral use of drugs, because, according to him, the drugs may not be well absorbed in very young children, particularly when they are suffering from diarrhoea.

The toxic effects of malaria in sucklings are discussed in detail and mention is made of interference in carbohydrate metabolism during malaria. There is little in these sections which needs comment.

The effects of malaria on the central nervous system in children are most striking. These disturbances often appear suddenly in apparently healthy children, and the fate of the child is often settled in a matter of a few hours. Sometimes the development is slower. Diagnosis is often missed and differential diagnosis is difficult. The author gives a table of the various central nervous system complications which may develop, *viz* —

The Nervous Complications of Malaria in Children —

A *Coma prodromal stage*

- 1 Cephalalgic form (headache only)
- 2 General asthenia, apathy, feeling of illness, nausea, usually with headache, hypersensibility and hyperaesthesia, eventually vomiting

B *Coma*

- 3 Coma with slow onset
- 4 Fulminating coma (so-called "Sunstroke" or "Apoplexy")
- 5 Meningitis form (including Ophthalmoplegia)
- 6 Encephalo-meningitic form
- 7 Infantile toxic malaria
- 8 Typhoid-type malaria
- 9 Epileptic form (convulsion) with epileptiform onset merging into coma
- 10 Tetanic form

C *Lesions with a more or less subacute course*

- 11 Neuritic form
- 12 Hemiplegic form
- 13 Athetotic form
- 14 Amblyopia
- 15 Ophthalmoplegia (see also B5)
- 16 Neuropathic form
- 17 Psychoses

The tremendous importance of correct diagnosis is emphasized. Many interesting case histories are given, including a number illustrating what the author describes as "fulminating coma". An apparently healthy child playing in the streets develops severe cramps and deep coma. In hot countries this may often be mistaken for sunstroke, which, in fact, may be associated with it. The author stresses that in all cases where sunstroke is suspected, blood examination must be made. If such examination is impossible, treatment should be started without delay. He recommends quinine injections. As an example of this type of case he quotes the history of a child of seven years who became ill while playing at home. He fell down suddenly, became immediately unconscious, and was brought into the clinic at once by neighbours. On examination there were very severe clonic cramps of the extremities, trunk and face. The child was deeply unconscious, the pupils constricted and non-reactive to light. He was vomiting, the spleen was enlarged, the temperature 41°C, and the blood showed *falciparum* parasites. The cerebrospinal fluid was under high pressure, there was an increase of cells, a small increase in albumin (40 mgm per cent), and a considerable increase in sugar content (180 mgm per cent). After lumbar puncture, the cramps lessened in

intensity but coma persisted. Intravenous and intramuscular quinine injections were followed by rapid recovery.

The author stresses the point that the meningitic form of malaria coma is relatively common in children, and that therefore cases may easily be mistaken for meningococcal or tuberculous meningitis. He recommends lumbar puncture in such cases not only as a diagnostic procedure but also because the pressure is raised in most malarial cases and should be relieved. He discusses the relation of the blood and cerebrospinal fluid sugar concentrations. In 42 cases with nervous complications in malaria, 33 showed an increase in cerebrospinal fluid sugar.

Psychosis as a result of malarial infection is apparently less frequently met in children than in adults. Acute psychoses however do occur and may be present in the prodromal stages of the attack. Case histories are quoted.

Possibly one of the commonest effects of malaria in children is the production of some degree of anaemia. The colour index may be equal to slightly greater or less than one and the red blood cell picture shows general reduction of numbers, together with poikilocytosis, anisocytosis and polychromasia. Megalocytes may be present in acute malaria, and, according to the author (in contrast to most observers) normoblasts are rare, which he regards as an indication of severe damage to the haemopoietic system. Severe anaemia in children as the result of malaria is commoner in some regions than in others. In the author's polyclinic, among 4,200 cases, there were 113 with haemoglobin between 10 and 35 per cent.

The white blood cell picture depends on the degree and state of the infection. Leukopenia is characteristic in the acute stage.

The author recommends treating anaemia by treatment of the malaria plus the administration of liver preparations and extracts of iron and copper. In very severe cases blood transfusion may be necessary. In the newborn and young sucklings 50 to 100 cc. of blood should be given in very young children, 100 to 200 cc. in school children 200 to 400 cc.

Blackwater fever may occur as a complication in children, the signs and symptoms differing little in detail from the similar condition in adults.

Treatment of malaria in children is discussed in detail. Doses of quinine in sucklings from birth to two months 30 to 50 mgm. per day from three to twelve months, 50 to 100 mgm. per day. In young children of one to five years, 100 to 300 mgm. per day in school children of six to fourteen, 500 to 800 mgm. or as much as 1,000 mgm. per day. In general, the author reckons the quinine dosage as 100 mgm. per year of life. Child of eight for example, would have up to 800 mgm. in the day. Certain non-bitter compounds of quinine are recommended.

Atebrin should be given after food with plenty of fluid. The treatment should continue from five to seven days. Children up to the age of four may be given up to 100 mgm. per day. From four to eight, 200 mgm. over eight 300 mgm. The author has observed nervous changes, including general sleepiness in some sucklings taking atebrin and in one child of four years ataxia of the lower extremities and ulnar involvement with recovery after two months. Behaviour changes were observed in a child of nine years who was treated for six days with atebrin 300 mgm. per day. This child became disorientated and had hallucinations. He was unaware of his surroundings and any kind of understanding with him was impossible. He became apathetic, had to be forcibly fed, and was incontinent of urine and faeces. After four days he recovered.

The dosages of pamaquin mentioned are those given by Nocht. In the upper age groups these are rather higher than are usually given to adults in Britain. For example, between the ages of six to fifteen, 10 mgm. from

three to five times in the day are recommended. The author points out that toxic symptoms may possibly occur with these dosages. This is hardly surprising.

At the end of the book there are some quite useful illustrations showing various methods of protection against malaria by screening, and photographs of children suffering from malaria, illustrating enlargement of spleen, toxicity in sucklings, liver cirrhosis, typhoid malaria, meningitic and encephalitic malaria, etc.

B G Maegraith

ONABAMIRO, Sanya Dojo [B Sc (Manchester), FLS] **Why our Children Die The Causes, and Suggestions for Prevention of Infant Mortality in West Africa** With a Foreword by Lancelot HOGBEN pp vi+196 1949 London Methuen & Co, Ltd, 36, Essex Street, Strand, W C 2 [8s 6d]

That infant mortality rates are high in tropical Africa is widely known, but few people, European or African, even if they have lived their lives in Africa, realize the extent of the wastage and tragedy of infant and child deaths. Nor is it only ignorance of the facts that delays and retards measures for improvement. Many Africans, even among the well-educated, accept as inevitable the appalling conditions. The main aim of this little book, written by a Nigerian zoologist, is to bring home the facts of infant and child mortality to the rapidly increasing number of educated men and women in British West Africa and to awaken them to the realization that most of these deaths are avoidable and that measures for eradication of the main causes can and should be undertaken at once.

As is the case throughout most of tropical Africa the vital statistics available for the four British territories on the west coast are very incomplete. Maternal and infant mortality data are recorded in annual reports but refer only to a small proportion of the population, that of the large towns and such few rural areas as are served by a hospital or mission. Even these are very high and such scanty evidence from the rest of the countries as can be gathered together suggests that the overall infant mortality rate for such territories as Nigeria and the Gold Coast is probably not less than 40 per cent or more than six times as high as the rate in the United Kingdom.

After summarizing the available statistics the author turns to the causes of the high mortality rates. Among these he first deals with African methods of midwifery. Here the author has been unusually fortunate: there can be few scientists who have been present at deliveries carried out by village medicine-men. His description of what takes place on these occasions is fascinating and probably unique. The actual methods of delivery of normal cases, being mainly natural, are open to relatively little objection, but the complete inability to deal with even the minor deviations from normal leads to many fatal results, and the risks to the infant of infection and exposure, in the insanitary surroundings and during the handling by unnumbered friends and relatives, are tremendous.

The child's chances of survival are largely dependent upon the mother's health during pregnancy, and its own exposure to disease in its early months of life. In both respects the scales are heavily weighted against it. Many West African women bear children at far too early an age and, during pregnancy, live in great poverty in insanitary surroundings, doing most unsuitable work and exposed to a wide range of endemic diseases. Above all, malnutrition and undernutrition are widespread throughout whole populations. This has a particularly adverse effect during pregnancy, as not only are the requirements greater at that time, but in many areas customs and taboos limit the food of the expectant mother.

Similarly during its early struggles the infant has to contend with a host of adverse conditions. Water-borne diseases, insect borne diseases, skin and respiratory tract infections, and helminthic and protozoal infections all contribute their share to high infant mortality rates.

The longest chapter in the book is devoted, probably rightly to malnutrition as the most important single contributory factor to high infant and child death rates. The author describes in considerable detail the nature functions and sources of all the known vitamins and indicates how greater quantities of these nutrients might be included in African diets. Understanding of this chapter demands a much higher level of scientific knowledge than does the rest of the book, and it may be that it will lose some of its effect from being above the heads of many readers. It would have been better to treat the subject from the point of view of foods rather than of nutrients. Moreover there is lack of balance here in that many pages are devoted to consideration of the vitamins, whereas protein and mineral deficiencies are dismissed in a few brief paragraphs, and pure caloric undernutrition, still probably the most common dietary defect in Africa, receives no mention at all.

In his final chapter of conclusions and suggestions the author wastes little time in apportioning blame for the existing conditions, though he does point out that these conditions do little credit to British Colonial Governments. The ultimate solution of the problems lies in a many-sided attack upon poverty, disease and ignorance. Improvement will come through economic advancement, extended medical and maternity services, a wide programme of dietary legislation and by education at every level and by all available means.

There are many points of detail in this book that could be criticised, but they are unimportant compared with the urgency of its message and complete conviction conveyed by the author. It is only to be hoped that the book achieves the wide circulation and active attention it deserves. Nothing in it is more eloquent than the dedication. To my mother of whose eight children seven died in infancy.

Dean A. Smith

SOUTH PACIFIC BOARD OF HEALTH. A Guide to Pacific Island Diets.

[Compiled by J. C. R. BUCHANAN] pp. xiii+75 1947 Sova, F.J.

This little handbook was originally intended for the use of the student and graduates of the Central Medical School in Sova, but it is hoped that it will reach a far wider range of readers. Nurses, teachers, health sisters welfare workers, members of the public and all in the area who are able in any way to exert an influence for the better use of food will find it of the greatest value and interest.

The book opens with a chapter on general principles. This is written at a semi-popular level, is brief but adequate and avoids the major pitfalls of inaccuracy which often appear in the simple presentation of a complex subject.

The chapter on common Pacific Island foodstuffs contains much information and includes descriptions of methods of cooking and utilization as well as of the foods themselves. This information is made use of in the dietary scales which follow. They are sound, realistic rations made up of readily-available local foodstuffs based on food categories and covering the needs of a range of sex, age and activity groups. The book ends with a table of food values and a selected bibliography.

The food tables consist of a few slips which will, no doubt be corrected in the next edition (e.g. Sourrop Protein 0.1 gm. Fat 0.4 gm. carbohydrate 17 gm. calories () and there is some confusion in the calculation of values for vitamin A and carotene but these very minor criticisms should not be held to detract in any way from the value of the work. It is as good a popular book as any yet written on the local foodstuffs of an area.

Dean A. Smith

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol 46]

1949

[No 10

SUMMARY OF RECENT ABSTRACTS*

VIII TYPHUS GROUP OF FEVERS

General

WEYER *et al* (p 1075) have examined rickettsiae by the electron microscope, and think that they resemble bacteria rather than viruses in structure and also in composition and behaviour. On the other hand, as a result of study of the action of enzymes on rickettsiae, CALLOT and VENDRELY (p 990) conclude that rickettsiae are intermediate in structure between bacteria and viruses.

CAMAIN (p 322) considers that the use of Machiavello's method, and hot Giemsa, is not a sure method of detecting rickettsiae.

*Proteus OX19 type Vectors, louse and flea**Louse typhus*

Epidemiology—MACCARTHY (p 696) notes the high louse-infestation rates found in people wishing to emigrate from Eire, and examined before doing so, and refers to two outbreaks of typhus in which infection was probably acquired by inhaling infected dust in which rickettsiae had remained virulent for 41 and 15 years respectively.

MORGAN *et al* (p 887) report two cases of Brill's disease, the form of louse-borne typhus which occurs as a recrudescence of a latent infection persisting indefinitely after an attack of that form of typhus. The patients migrated from Ireland to the United States 30 or more years ago.

In prisoners and others who returned to France in 1945, 167 cases of typhus were seen in Paris. BOYER (p 57) shows that there were only 15 cases secondary to these. Doctors and others in contact with repatriated persons were vaccinated with the Durand and Giroud vaccine. In spite of the influx of refugees during the war, and of the epidemic in Spain in 1941-42, there were relatively few cases in Portugal (DIAS, p 58). It was, however, proved that gypsies introduced it into the country from Spain.

Typhus in a hospital in Finland is described by HIRVONEN (p 776).

In the town of Jos, Northern Nigeria, louse infestation is heavy, and there was an outbreak of typhus in 1945. MONTGOMERY and BUDDEN (p 322) soon controlled the epidemic by dusting with DDT. Laboratory examinations made in connexion with this outbreak are reported by FINDLAY and ELMES (p 322), who isolated rickettsiae from patients and from lice. In a minority of tests

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1948, v 45. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

some strains reacted more like murine than epidemic rickettsiae and the authors make the point that both these forms are known in West Africa, and that the tick-borne form also probably occurs there. In the third paper of the series (p. 324) Montgomery describes the clinical features observed which he thinks, were unlike those of classical typhus (but in comment MEGAW demurs at this conclusion).

JADIN (p. 325) has isolated orchitic strains of rickettsiae in two cases of the "red fever of the Congo" at Coetmansville. In each case the Weil-Felix reaction with *Proctus QX19* was positive but in two other cases this test was negative or positive at low titre only. JADIN and D'HOOGHE (p. 508) however claim to have isolated epidemic typhus rickettsiae from other patients in whom the diagnosis of red fever had been made. MEGAW comments that there is now no valid reason for retaining the name.

The epidemiological conditions at Lanchow in North-West China suggested that typhus is louse-borne, and this was corroborated by detailed examination of certain strains isolated (WAXO *et al.* p. 777).

Positive results to the Weil-Felix reaction were found (to a titre of 1 in 100 by FLOCH and CAMAR (p. 250) in a small proportion of sera submitted in French Guiana for the Widal test. They describe a case of murine typhus in man.

A complement fixation test in which *R. prowazeki* was used as antigen indicated that a quarter of the people in a group of villages in Colombia had been infected with typhus but MONTORA *et al.* (p. 419) point out that the antigen did not differentiate between the louse-borne and the flea-borne types though epidemiological conditions suggested the former.

Aetiology transmission.—RABINOWITZ (p. 896) has cultivated *R. prowazeki* in embryonated eggs killed by chilling on the third day of development.

CLARKE and FOX (p. 906) show that suspensions of *R. mooseri* and *R. prowazeki* cause haemolysis of red cells from rabbits and sheep but not from certain other animals. The degree of haemolytic activity (which is inhibited by homologous anti-serum) may provide an index of infectivity and the haemolytic factor may be identical with the rickettsial toxin.

By experiments on chick embryos infected with typhus rickettsiae and by using *p*-aminobenzoic acid and potassium cyanide GRIFF and PINKERTON (p. 508) have shown that rickettsial growth is inversely proportional to the respiratory rate of the host cells.

Desiccation of *R. prowazeki* in suspensions from the lungs of mice over calcium chloride *in vacuo* at 15°C. appears to reduce the number of viable rickettsiae compared with desiccation by the lyophile method at -10°C., when tested by the intradermal route but GIBSON and VARGAS (p. 1073) found little difference on intraperitoneal injection.

ANIGSTEIN *et al.* (p. 699) infiltrated the skin of guinea-pigs with anti-organ sera (prepared by inoculating rabbits with spleen or bone-marrow of guinea-pigs) and into the same area 2 hours later they injected material infective for typhus. Infection rarely occurred, but the authors do not claim that this procedure can be applied usefully in relation to human disease.

DELBORF and REYNES (p. 61) have investigated the course of typhus in guinea-pigs infected with *R. brucellae*.

KUTICA (p. 420) cultures lice in sterile conditions so that they can later be fed on patient suspected of typhus, and the diagnosis can be made by examination of their faeces.

Pathology.—CORREJO and ZITO (p. 591) have studied the histopathology of the small blood vessels in typhus and GURRINI (p. 591) that of the kidneys in the glomerulonephritis sometimes observed in typhus. HORTON *et al.* (p. 167) discusses the forms of gangrene found in typhus, and their pathology.

DE ROSNAY (p 166) states that the bone marrow in typhus shows an intense reticulo-endothelial response in the early stages, which may have diagnostic value. REVOL *et al* (p 590) have also studied the bone marrow in typhus. A study of the red cell sedimentation rate in typhus has been made by GOYTIA (p 324).

FRANK and MAY (p 988) investigated the protective power of human convalescent serum when mixed with rickettsiae of murine or classical typhus before inoculation into animals, the results were very variable. SIEGERT (p 988) refers to the antitoxic power of serum after typhus, in protecting mice from death after injection of rickettsial toxins. This power is much greater in persons recovered from the disease than in those who have been vaccinated.

Tests—With carefully prepared antigens of epidemic and murine typhus. PLOTZ *et al* (p 699) were able to show that the rickettsia-agglutination test in typhus was positive earlier than the complement-fixation test, and that by both tests it was possible to differentiate between epidemic and murine infections. The agglutination test gave more cross reactions than the complement-fixation test. Similar work on murine typhus was carried out by almost the same team, SCOVILLE *et al* (p 700), with similar results. The murine rickettsia-agglutination test was always positive after the 9th day, but the murine complement-fixation test with washed antigen was negative at 10–19 days in most cases, though with non-specific soluble antigens it became positive earlier.

JADIN and GIROUD (p 592) note that in an epidemic of typhus in Urundi, 18 of 23 sera agglutinated epidemic-typhus rickettsiae at much higher titres than murine rickettsiae. These authors (p 697) prefer the rickettsia-agglutination test to the complement-fixation test, and make the point that it clearly differentiates between epidemic and murine typhus during the 3rd and 4th days of the attack, and after the height of the attack, but less clearly in the intermediate stage or when the serum has been inactivated by heat or has long been stored.

GIROUD and LE GAC (p 1076) have done rickettsia-agglutination tests (with murine and epidemic rickettsiae) and Weil-Felix tests, on patients with boutonneuse fever, and conclude that there is an antigen common to epidemic typhus and boutonneuse fever.

SANDOR *et al* (pp 166, 986) have studied the relationship of anti-typhus agglutinins in infected animals, to the various euglobulin fractions of serum.

GIROUD *et al* (p 60) show that crushed and washed typhus tissues retain appreciable amounts of antigen, and that potent antigens in suspensions of infected animal lungs provoke a rise in rickettsia-agglutinin titre on injection into rabbits. GIROUD and CIACCIO (p 885) show that soluble antigens from the lungs of rabbits infected with *R. prowazeki* extracted with alcohol are rather more satisfactory than those extracted with saline solution or water.

BERGE (p 778) has used soluble antigens of *R. prowazeki* and *R. mooseri*, released by extraction with ether, for the complement fixation test. These antigens do not differentiate between the two types of typhus, but the test has a value for screening, and therefore for reducing the need for subsequent more refined tests, in diagnostic and survey work.

The addition of traces of egg yolk to suspensions of yolk sacs infected with various rickettsiae before treatment with ether gives antigens with enhanced complement-fixation titres (HOTTE and SHEPARD, p 248).

VAN DER SCHEER *et al* (p 60) show that although non-specific reactions with Wassermann-positive sera are given in complement-fixation tests in which yolk-sac rickettsial vaccines extracted with ether are used as antigens, they rarely occur if the vaccines are purified by shaking with benzene and concentrated by precipitation with sodium sulphate. By these tests Rocky

Moussain spotted fever can be distinguished from epidemic and murine typhus, but differentiation of the two last was not easy.

BARKENFELD and DROCKERT (p. 591) prefer fresh serum to serum inactivated by heat in the complement-fixation test for typhus.

GIROUD and JUDÉ (p. 167) quote evidence which indicates that there are specific differences between the agglutinins for *Proteus* and rickettsiae. GUÉ (p. 887) shows that agglutinins against *Proteus* O119 are very variable in their resistance to heating at 50°C. for one hour. Thermostability is not valid in differentiating agglutinins derived from infections with *Proteus* from those arising as a result of typhus. HINDSFELD (p. 697) has isolated strains of *Proteus* V from blood, urine or post-mortem material of patients with typhus.

Clinical findings.—SCHMIEDER (p. 887) has studied the encephalogram in patients showing after-effects of typhus. It has some diagnostic value.

BERCEANU and CUCUREANU (p. 688) noted that nervous symptoms dominated the clinical picture in 141 of 230 cases of typhus in Bucharest and that in all 230 there was some degree of cellular reaction in the cerebrospinal fluid. LEMKE (p. 62) gives details of some of the late effects of typhus especially in relation to the nervous system and the heart.

HORTOPANT (p. 608) relates the comparatively low mortality in typhus of recent years to the improvement which has taken place in the standard of life in European countries, and he comments on the relatively high mortality in people over 40. DIGNAZZIO (p. 888) refers to the recent dramatic fall in the case-fatality rate of typhus in Ethiopia. This is probably the result of improvement in hygienic conditions, louse control and the use of vaccines.

T. naturalis.—Chloromycetin is described by EHRLICH *et al.* (p. 779) and its great value in prevention and treatment of rickettsial infections of chick embryos and mice is reported by SMADEL and JACKSON (p. 779). In human typhus its remarkable value was shown on a small scale in Colombia by PAYNE *et al.* (p. 779) who gave it by mouth or intravenously. There were no toxic effects. LAY, SMADEL and CROCKER (p. 1076) administered chloromycetin by mouth to normal persons in various doses and noted the blood levels. Excretion is rapid and no ill effects were experienced. SMADEL, LAY and VARELA (p. 1077) used it in several cases of typhus in Mexico, with good effect. They suggest an initial dose of 40 mgm. per kilo body weight, followed by a daily dose of 35 mgm. per kilo in divided doses at intervals of 2 hours, until improvement occurs, then a daily dose of 20 mgm. per kilo (divided, every 4 hours) until the 14th day after onset.

GIROUD (p. 420) has shown that streptomycin has a definite effect on typhus rickettsiae when tested intradermally, but much less when mice infected intranasally are treated with it. Certain acetone compounds were found by SMADEL *et al.* (p. 168) to have rickettsiostatic effects in infected chick embryos, but the margin of safety was low. Later (p. 321) the authors showed that streptomycin inhibits the rickettsiae of typhus and Rocky Mountain fever, but not of tsutsugamushi disease in the same conditions, and that nitroacryline and β -aminobenzoic acid have some synergic action with streptomycin.

REXER (p. 779) has treated large number of cases of typhus. He distrusts many of the drugs which have been advocated by others, but he has had success by administering cardiovascular tonics and sedative drugs, only when there are definite indication for them. Convalescent blood is useful (but the author gives little relevant information) only when given up to the third day of illness.

Trials of 17 methods of treatment of typhus were made during 8 years by FERRO-LUZZI and FERRO-LUZZI (p. 719) in Entrea. These did not include the use of β -aminobenzoic acid. The only one which seemed to give good results was the administration of asparin, but in comment MCGAW suggests that the

controls used do not satisfy the requirements necessary for unequivocal acceptance of the value of this treatment

Vaccination —BIELING and OELRICHS (p 886) use the intradermal injection of minute quantities of yolk-sac growth of typhus rickettsiae, as a means of measuring the antigenic potency of the strains With large doses (and also with killed suspensions) this method provides an appreciable degree of immunity against homologous strains within 7 days The potency of vaccines can be measured by the quantity of immune serum needed to prevent the Giroud reaction

In 60 laboratory workers constantly exposed to typhus infection, and protected by the Durand-Giroud vaccine, 12 suffered from mild attacks and 4 from inapparent attacks, all diagnosed by Giroud's intradermal test and rickettsia-agglutination tests (CHEVÉ *et al*, p 249)

RUIZ CASTAÑEDA (p 592) has elaborated a method for purifying and concentrating suspensions of epidemic- and murine-typhus rickettsiae for the preparation of vaccine He prefers the vaccine containing both types, partly because the murine form may be transmitted from man to man by lice, in epidemic fashion, and he advises that a course of 5 doses should be given, at weekly intervals ORRIZ MARIOTTE (p 1077) reports a test of the Castañeda bivalent vaccine in Mexico in 1942-43 There was apparently some benefit, but the numbers are small Later an improved vaccine gave better results

FRANKE (p 777) observed the Weil-Felix titre after inoculation with 3 doses of various vaccines, the titre rose moderately in most cases, but soon declined

Control —By using 10 per cent DDT in talc or pyrophyllite for body lice, and 5 per cent phenyl cellosolve for head lice, on several occasions, MONTORA and OSEJO (p 989) reduced the infestation rates in a Mexican village to less than 5 per cent for several months In another village, and with only one application, the rates were much reduced, but increased again after some months

Flea typhus

DUNN (p 781) reports a case, apparently of murine typhus, in a London dock worker much exposed to fleas while unloading cargoes from abroad

SAVOOR *et al* (p 888) have investigated cases of typhus in Bombay City, and conclude that the clinical and epidemiological features are consistent with the diagnosis of flea-borne typhus They describe a modification of the rapid slide test with *Proteus OX19* They (p 1077) have isolated and studied strains identified as *R mooseri* in Bombay They report their study of the characteristics of these strains, which are of lower virulence than the Wilmington strain

RAYNAL (p 59) once more argues his theory that in Shanghai the rickettsiae of murine typhus are spread by fleas from rats to man, and thence from man to man by lice He names the common rats and their fleas But in addition, during the war, true louse-borne typhus was introduced from outside, and resulted in epidemics Murine typhus has been detected in cats in Shanghai, and RAYNAL (p 251) refers to the possible danger of infected cats to man

Most of the 184 cases of typhus in two hospitals in Chengtu appear to have been of the flea-borne type (LIU *et al*, p 325)

ESKEY and HEMPHILL (p 990) show that murine typhus in the United States is found chiefly in the south The months of highest prevalence are July-September and the numbers of cases reported have increased almost every year since 1913 perhaps because the disease is now more generally recognized Typhus of murine origin is spread uniformly in Florida, U S A, and the rural population is nearly as heavily infected as the urban, RICKARD and RILEY (p 780) estimate that two-thirds of the patients reported in 1944-1946 acquired

infection in their homes—most of the others were probably infected at their places of business especially those concerned with food handling. In Texas IRONS *et al.* (p. 780) showed that almost all urban establishments examined harboured rats with positive complement-fixation tests for typhus and that 7 per cent of farms examined also harboured such rats. The disease is evidently widespread in rats and these rural areas must be included in control schemes. DAVIS (p. 888) shows that the complement fixation test was positive in 34.7 per cent of *R. rattus* and 51.4 per cent in *R. norvegicus* in a town of Texas. Rats from grain mills were more frequently positive than others.

COLE and KOEPKE (p. 41) discuss the interpretation of the data of rodent ectoparasite surveys and give in detail the results of surveys in Florida, Georgia and Alabama. The long paper contains analyses of large surveys of rats, their fleas and mites and for these the original should be consulted. The work has a bearing on flea-borne typhus.

CALFRO (p. 702) reports an outbreak of typhus of murine origin in Panama city. The patients had all worked in a food store.

A long description of the characters of a strain of murine typhus rickettsia given by HALYRANU and CONSTANTINESCU (p. 1078).

WEI and WEI (p. 62) have infected silkworm pupae with murine typhus rickettsiae. VARELA and MAZZOTTI (p. 251) show that the armadillo and the field rat are susceptible to murine typhus.

Rats become more susceptible to typhus than normal if they are given a diet low in protein, or in certain vitamins of the B group (pantothenic acid, riboflavin, thiamin). FITZPATRICK (p. 781) shows that reduction of the amount of certain other substances does not have the same effect.

NYKA (p. 325) reports a close study of the histological changes in the lungs of rats inoculated by the nasal route with murine rickettsiae and of the development of the rickettsiae themselves.

In a typhus control programme in the southern United States (relating to flea-borne typhus of murine origin) the method adopted was to apply 10 per cent DDT to rat runs, burrows and harbourages. WILFY (p. 423) shows that there was a very considerable reduction of human cases in the dusted areas, compared with the incidence in former years, and that the numbers of *Y. cheopis* have greatly diminished.

Proteins OVA type Vector mite

The War Office has reproduced, in mimeograph form, a series of reports by ARDY and his colleagues (p. 62) on investigations on scrub typhus in south-east Asia. The work was done largely at the Scrub-Typhus Research Laboratory Imphal, in 1945-46. There are papers on the outbreak which occurred and on the work of the Medical Research Council Scrub-Typhus Commission (the latter by Dr R. LEWTHWAITE). The second part consists entirely of illustrations but the third part comprises 22 appendices, of which several by ARDY PARKER, HALRA, RADFORD and BROWNING deal with epidemiological subjects, including accounts of outbreaks in India, Ceylon and the Maldives Islands. Some of these have already been noticed in this Bulletin. Four appendices deal with subjects relating to the various mites, especially *Trombicula deliensis* which may be a variant of *T. akamushi*. Several appendices refer to bacteriological and serological aspects of the subject and a few to the survey methods adopted. It is not possible to condense these important papers further; they cover a very large field, and form a most important record. The original abstracts give much information on their contents.

In a review of knowledge of scrub typhus gained during the war FENN (p. 991) refers to the fact that it might have seriously interfered with the campaign had not quick and effective measures of control been devised. He

points out that larval mites do not ingest blood, but only lymph and tissue fluids, and that they do not remain attached to animal hosts for more than 3-4 days. The chief reservoirs of infection are the mites themselves (as also are the ticks of tick-borne typhus), and the vertebrate hosts are only transitory reservoirs [but see FOX, below]. There is evidence of much difference in virulence in different areas, case-fatality rates varied from 0.6 to 35.3 per cent in different outbreaks.

SAYERS and HILL (p. 593) report on the fevers of the typhus group in South-East Asia Command during 1941-44. There were about 5,500 cases, of which more than 90 per cent were of mite-borne typhus, and a small proportion of tick-borne or possibly flea-borne disease.

SAVOOR & DAS MENON (p. 781) diagnosed four cases of scrub typhus in persons who had not been away from Bombay City for four weeks before the attack. *R. orientalis* was isolated from one. Infection was probably acquired from mite-infested coarse vegetation, or from the handling of vegetables. SOMAN (p. 701) reports on the Weil-Felix reaction in Bombay, where the response is usually of the *Proteus* OX19 type, though cases of OXK reaction are seen. In comment, MEGAW points out that the tick-borne disease may give the OX19 response. SOMAN and DAS MENON (p. 890) also report cases in Bombay in which the reaction was of OXK type, and the rickettsiae of *R. orientalis* type.

Liu *et al.* (p. 1079) report 6 cases of the *Proteus* OXK type from north-west China. Previous records of this form in China have been rare.

RIGHTS and SMADEL (p. 702) have shown that resistance provoked by various strains of *R. orientalis* is not necessarily valid for heterologous strains.

The Moroccan rodent *Meriones shawi* is susceptible to intraperitoneal inoculation of *R. orientalis* (NOURI, p. 889).

DAVIS *et al.* (p. 70) refer to the recovery of 85 strains of *R. orientalis* in Assam and Burma, and to the demonstration of the actual presence of rickettsiae in the tissues of a rat experimentally infected by laboratory-reared offspring of infected mites. FOX (p. 889) has recovered *R. orientalis* from the tissues of infected Swiss mice as long as 610 days after experimental infection, and in cotton rats up to 269 days. The blood was also positive, but for shorter periods. He comments on the significance of these findings in relation to the rodent reservoir of tsutsugamushi disease.

KALRA (p. 70) has observed intracellular inclusion bodies in association with intraperitoneal infection of mice with *R. orientalis*.

The incubation period of tsutsugamushi disease in North Queensland is about 13 ± 2 days. SOUTHCOFF (p. 251) noted that most of the eschars were on exposed parts of the body, which suggests that dibutyl phthalate should be used in prevention. There is evidence that birds are important in spreading the mites, and lizards in maintaining them.

An account of scrub typhus in 68 patients in North Burma is given by REDDI (p. 71); he diagnosed the disease only if the *Proteus* OXK titre rose to 1 in 320, and he notes that in the first week most of the patients showed a positive Widal reaction at 1 in 160 or 1 in 320.

FOX and PETERSON (p. 592) have found that certain thionine dyes have a bacteriostatic action in infections of mice with *R. orientalis* and *R. mooseri*.

SANDER and MORTON (p. 252) have found that a mixture of equal parts of benzyl benzoate and dibutyl phthalate is almost as good as, and rather more persistent than, benzyl benzoate alone, for the impregnation of clothing to protect against mites. Benzyl benzoate itself is rather more effective than dibutyl phthalate. HORTON *et al.* (p. 593) report toxic effects from benzene hexachloride impregnated in garments as a protection against mites to such an extent that it can be used safely only in such low concentrations as to

eliminate any advantages as an insecticide it might possess over other compounds.

Benzene hexachloride at the rate of 6 lb. per acre is lethal to mites for three weeks or more. LIXDUSKA and MORTON (p. 326) have used it from aircraft or applied by hand, in trial plots of land. The object was to find a means of preventing scrub typhus by destroying the vectors before the land is used for camping.

Indeterminate type Vector tick

BETTINARDI (p. 423) has written a critical summary of the extensive literature of the tick-borne typhus of the Mediterranean. PARTILOS (p. 377) reports a case which he diagnosed as boutonneuse fever in Cyprus. COMBESCU (p. 1047) has isolated rickettsiae from *R. sanguineus* in Rumania where boutonneuse fever occurred.

FINDLAY and ARCHER (p. 782) report three cases diagnosed as tick-borne typhus in European soldiers in West Africa. Serological tests indicated affinity with South African tick typhus but not with house-borne or flea-borne typhus. DICK and LEWIS (p. 328) describe a rickettsial disease in troops and prisoners of war in East Africa, which they think was transmitted by ticks (*Rh. picephalus simus* and *Hemaphysalis leachi*). Similar cases were being reported from many areas at the same time. STOKES (p. 800) has isolated strains of epidemic and murine typhus rickettsiae in Eritrea. He has also isolated strains from the ticks *Rhipicephalus sanguineus* and *R. appendiculatus*. He describes an outbreak of tick typhus which is closely allied to boutonneuse fever. Some of the dogs in Asmara give Weil-Felix reaction of OX19 or OX4 type at high titres (STOKES and SOLIMAR, p. 800).

STREETLY *et al.* (p. 831) report tick typhus from Queensland. In some of the cases the Weil-Felix reaction was positive in high titre to *Proteus* OX19.

In Mexico epidemic and murine typhus, and Rocky Mountain spotted fever are known to occur. BUSTAMANTE and VARELA (p. 165) note that *Rh. picephalus sanguineus* and *Am. m. mexicanus* are the vectors of spotted fever. These authors (p. 232) produced typical Rocky Mountain spotted fever in guinea-pigs inoculated with material from *R. sanguineus* collected from river parts of Mexico.

KELSEY and HARBELL (p. 1079) discuss the treatment of Rocky Mountain spotted fever in children. There is an indication that hyperimmune rabbit serum may be useful if given during the first 3 days. With a dose of 0.33 to 0.5 gm. *p*-aminobenzoic acid per lb. body weight in children suffering from Rocky Mountain spotted fever. TICKNOR *et al.* (p. 328) maintained blood level of 15-40 mcgm. per cent. This treatment was continued for about 7 days, and the results indicated beneficial action in 6 of 8 cases so treated. For the treatment of Rocky Mountain spotted fever RAVENEL (p. 168) has used *p*-aminobenzoic acid in doses 1.05 gm. per pound of body weight for large children, or more for small children. Give blood concentration 130-60 mcgm. per 100 cc.

Serological studies undertaken two years after an outbreak of what was diagnosed as atypical pneumonia have shown that the patient reacted strongly to the complement-fixation test for Q fever. LA GRILE and DIXON (p. 164) therefore think that the outbreak (in Italy in 1945) was Q fever, which was responsible for a number of outbreaks about that time.

COMBESCU *et al.* (p. 104) have identified rickettsial disease in man in Rumania which was probably Q fever. LAYZ and GOURIN (p. 841) report Q fever from Turkey.

Q fever

GSELL (p 327) has established the occurrence of Q fever in Switzerland. Although the reservoir and the mode of transmission could not be determined, there seems to be an association with cattle and the possibility that infection may be acquired by inhalation of infected dust. An outbreak of Q fever, diagnosed retrospectively by serological tests, occurred in men in Switzerland engaged in unpacking heavy goods from America. WEGMANN (p 782) thinks that this was due to inhalation of infected dust from the packing straw.

An outbreak of Q fever took place in a Chicago slaughtering establishment. SHEPARD (p 71) points out that the patients handled the freshly killed animals, and as there was no indication of transmission by arthropods, he thinks that infection was probably acquired by inhalation of infected droplets. SHEPARD and HUEBNER (p 992) discuss the epidemiology of Q fever (often diagnosed originally as atypical pneumonia) in Los Angeles County. It occurs in cattle, and in people associated with them, *R burnetii* has been found in raw milk. There is no evidence of tick transmission to man. Many cases of Q fever in California were in patients who had close contact with dairies, and 10-20 per cent of the cattle gave positive complement-fixation tests for Q fever. HUEBNER *et al* (p 509) infected guineapigs by injecting pooled milk, though none of the cows giving the milk was ill. Although there is no definite incrimination of milk in human cases, it is possible that it may be a source of infection by some mode yet to be determined.

STRAUSS and SULKIN (p 783) have found positive complement-fixation tests for Q fever in meat-handlers in Texas, they are probably the result of unrecognized attacks of Q fever. The same authors (p 783) note that the complement-fixing antibodies tend to persist for many months after clinical attacks of the disease.

EKLUND *et al* (p 71) describe a case of Q fever probably contracted by exposure to ticks in nature in Montana, perhaps through crushing them against the skin.

BLANC *et al* (p 892) used Q fever therapeutically in cases of mental disease. When infected guineapig material was injected intramuscularly a short fever resulted, but injection of infected ticks caused a longer spell of fever. Intradermal injection gave a local reaction, and very slight fever (in two patients out of 10). Nasal instillation also gave slight fever except in two who inhaled heavy suspensions, they, and also two attendants who wore masks, developed pulmonary manifestations.

Streptomycin is rickettsiostatic, and HUEBNER *et al* (p 594) have found that it is effective in treatment of guineapigs infected with *R burnetii*, but the treatment was started much earlier than would be possible in human Q fever. Successful treatment of Q fever with streptomycin is reported by ROSOVE *et al* (p 892).

SMADEL *et al* (p 424) have prepared yolk-sac vaccines of the rickettsia of Q fever, but have had no opportunity to test them in man.

Trench fever

ASCHENBRENNER (p 783) reviews the literature on trench fever.

BIELING and OELRICHS (p 893) found that Russian prisoners of war employed as donors of blood to clean, laboratory-bred lice infected them with *R quintana*, although the prisoners had not been exposed to infection for 2-3 years. The infectivity was not associated with recrudescence of symptoms of the disease. The same authors (p 892) show that serum of human convalescents from trench fever inhibits *R quintana*, and that this can form the basis for a Giroud test.

Rickettsialpox

The initial lesion of rickettsialpox resembles that of scrub typhus and the rash is similar to that of other rickettsial diseases, except that vesicles occur (Duganov, p. 703)

An account of rickettsialpox has been written by GREENBERG and PRILLITZ (p. 71)

Charles Wilson

MALARIA

DE OLIVEIRA, C. G. & FREIRE, F. Jr. Uma epidemia de malária inoculada. [An Epidemic of Inoculated Malaria.] Reprinted from *Bol. Clin. Hosp. Cruz Lisboa*, 1948, v. 1, No. 4, 32 pp. (20 refs.) English summary

This is the report of a thorough investigation of a remarkable outbreak of *P. falciparum* malaria in Lisbon

In February and March 1946 two patients were admitted to hospital apparently suffering from malignant jaundice consequent upon neosalvarsan treatment of the syphilis from which they were suffering. Investigation showed that they were both suffering from *P. falciparum* malaria—both had anaemia and jaundice and one had cerebral symptoms. Two weeks later a third similar case was admitted. None of the three men had ever left Lisbon. *P. falciparum* malaria is not indigenous in Lisbon. The three men had all been undergoing treatment for syphilis in the same out-patient department.

One hundred and eighty-nine patients out of the 297 who had attended the venereal disease clinic during December and January were traced and examined. Twenty-five further *P. falciparum* infections were discovered. Thus there were 28 cases in all—six patients died.

The source of the infection appears to have been the regurgitation of blood into the syringe during the injection of neosalvarsamine into a sailor who had contracted both malaria and syphilis in Portuguese Guinea in the previous September. Thus the stock solution of the drug in use on that day became contaminated. This may have happened on two occasions—December 10th and January 17th.

Norman Blake

ZOLTAI, A. A malária helyzet alakulása Magyarországon és a vértelen lehetőségei. [Malaria in Hungary and its Prevention.] *Véprezési közp.* Budapest, 1949, Mar 1, v. 30, No. 9, 281-7, 3 figs., 14 refs. French summary, p. 304

For many years malaria in Hungary had become a *maladie acclimatée* but its exact distribution was not worked out until the beginning of the present century. Special studies were undertaken by the parasitology department of the Hungarian Institute of Public Health from 1900 onward.

Before the last war there were only two epidemic foci in the north-east and south-west respectively, in their departments malaria where it existed at all, was only sporadic. The vectors are *Anopheles maculipes*, *A. stephensi*, *A. hyrcanus*, *A. messeae* and *A. foveatus*.

From 1933 to 1936 the number of cases notified annually had not exceeded 2,000. In the next five years the yearly average was about 5,000 and in 1941 it exceeded 6,000. The limit of malarial morbidity was reached in 1943 when 8,700 cases were reported. The author believes however that the number of cases notified represents only about one-tenth of the real total which he puts at 80,000 to 100,000 per year. Most of the infections are caused by *P. m.* and about 10 per cent by *P. falciparum*.

The direct mortality caused by malaria in Hungary is minimal. The principal importance of the disease is that it reduces general resistance and it has serious economic consequences in taking people away from their agricultural work during the summer.

After the war years of 1944-45, the malaria position in Hungary underwent a fundamental change. As a result of large-scale movements of troops and civilians, indigenous strains became widely diffused and new strains were introduced from outside. A large number of new foci were created and malaria appeared in many districts where it had not been known before or where it had been very limited. These new foci now accounted for about half the cases notified although previously the majority of cases had been reported in the two original foci referred to above.

These new conditions aggravated the serious economic consequences and antimalarial work was intensified. Besides free drugs distributed by the Institute and the extension of general control work on breeding grounds and water sources, experiences with DDT in 1947 have promised excellent results.

The distribution of malaria in Hungary is shown in two maps, a chart and a table.

H J O D Burke-Gaffney

MALMEJAC, R. Rapport sur l'épidémie de paludisme sévissant en 1946 dans le département d'Oran [Epidemic of Malaria in 1946 in the Department of Oran] *Algérie Med* 1947 Mar No 3, 259-63

A very severe outbreak of malaria occurred in the Department of Oran in 1946 more especially in the east and south-east. The previous three years had been dry and there had been a steady regression of malaria incidence. Insufficient treatment of cases, insufficiency of gametocidal drugs and the arrival in the Department of infected workers from Morocco ensured widespread sources of infection. Antimalarial measures were altogether inadequate, abundant spring rains caused a multiplicity of anopheline breeding places. The susceptible population was increased by the arrival of nomads from the high plateaux in large numbers. The resistance of the indigenous population had been weakened by successive epidemics of typhus and relapsing fevers.

Pernicious forms of malaria were unusually prevalent and the fatality rate was high. *P. vivax* and *P. falciparum* infections were both numerous, the latter appearing in September. Pernicious attacks of *P. vivax* malaria were commonly seen.

The author concludes with an urgent plea for the expansion and intensification of antimalarial work in the Department.

Norman White

SCHWETZ J, BAUMANN H & FORT M. Contribution à l'étude du paludisme endémique dans le district du Kwango (Troisième note) [Contribution to the Study of Endemic Malaria in the Kwango District] *Ann Soc Belge de Med Trop* 1948 Dec 31 v 28 No 4 421-8

The authors report the results of the examination of thick drops and smears of blood from 167 children under two years of age living in villages near Feshi in the Kwango District of the Belgian Congo. Malaria has been less studied in this District than in others: a previous report was published in 1938 [this *Bulletin* 1939 v 36 778]. Feshi lies to the east of the area previously studied.

Malaria parasites were found in 53.2 per cent of these children under two years of age. *P. malariae* was found in 14 children, in association with *P. falciparum* in all cases but one. *P. vivax* was not found. Gametocytes of *P. malariae* were noted in 14 and crescents in 38 films. For the most part the parasite densities were not high.

Norman White

The cessation of fever accompanied by a drop in the number of parasites in the third week of the disease is regarded as the first sign of acquired immunity. The subsequent invasion of the reticulocytes is said to represent a reaction on the part of the parasites against the defence forces of the host, affording protection which enables them again to increase in numbers and bring about a new febrile paroxysm.

C. A. Hoare

OWOBI, N. Observations on the Nocturnal Activities of the Anopheline Mosquitoes in Taiwan. I. Preliminary Report. *Acta Soc. Trop. Taihoku*. 1949, v 4 No. 1, 2, 59-67 2 pls. [11 refs.] (Summary taken from *Rev. Applied Entom.* Ser. B. 1949 Mar v 37 Pt. 3 38-9)

An account is given of studies carried out in 1939-40 on the nocturnal activities of Anopheline mosquitoes in a village in Formosa situated at the foot of the mountains, 500 ft above sea level. There were irrigated rice-fields and streams of running water in the neighbourhood and the people kept cattle, pigs and poultry. A bait trap of mosquito nets of the type described by Gater was used in the studies. A man occupied it from sunset onwards and collections were made every hour or two hours by means of a chloroform tube and an electric hand lamp. The observations were made on nine occasions, covering every season except spring, the trap being indoors on rainy nights and outdoors in fine weather. The mosquitoes were comparatively inactive when it was cold, rainy or cloudy. Results are shown in tables. Considerable numbers of mosquitoes entered the trap throughout the night in July whereas their activity decreased considerably after midnight in October. This was probably on account of the higher temperature in July as well as an hour's difference in the time of sunset. The species could be roughly divided into three groups. The first, comprising *Anopheles maculatus* Theo., *A. annularis* Wulp., *A. hyrcanus* var. *sinensis* Wied. and possibly *A. tricoloratus* Theo. began to enter the trap just after sunset, their numbers reached a peak in 3 hours, diminishing gradually until midnight and very rapidly thereafter. The second, consisting of *A. m. m.* Theo., and possibly *A. splendidus* Koide, showed increased activity about midnight and the third, comprising *A. pyreticus* or *cardioides* Koide, maintained sporadic activity through the night showing no definite pattern. Two females of *A. fulvipes* Theo. were also taken. *A. annularis* was by far the most abundant species and *A. m. m.* and *A. maculatus* were next in order of frequency. The total numbers taken being 2,151, 184 and 179 respectively. *A. m. m.* has been considered the principal vector of malaria on the island, followed by *A. maculatus* but in view of its numerical predominance the author considers that *A. m. m.* should be taken into account. Notes are also given on the results of collections of larvae from streams and other water near the village. *A. annularis* and *A. maculatus* were most frequently taken and larvae were also found of *A. fulvipes*, *A. austriacus* var. *bengalensis* Puri, and *A. indus* Giles, species that were not attracted to man, and of *A. hyrcanus* var. *sinensis* and one each of *A. punctatus* and *A. m. m.*

PECK, C. H. Pupae of the Neartic Anopheline Mosquitoes North of Mexico. *J. Nat. Hist. Museum Soc.* 1949 Mar. N. S. 1 50 figs 14 pls. 16 refs.

HARRIS, R. L. Universal Serologic Reaction with Lipid Antigens. V. In Malaria. *Amer. J. Cl. Path.* 1949 May 19 No. 5 414-15, 4 figs. Summary appears also in *Bullet. J. Hygiene*.

For the study of the universal reaction in malaria nine volunteers were inoculated with *Plasmodium vivax* and their sera were tested before inoculation.

and at various periods after inoculation. In one case, which was fairly typical of all, the results were as follows — (1) before inoculation limited precipitation in Zone I especially after 4 and 24 hours' incubation at 5°C, none in Zone II slight in Zone III after 4 hours and moderate after 24 hours, (2) 15 days after inoculation (when fever was subsiding and parasites becoming fewer) results much the same as in (1), (3) 29 days after inoculation considerable precipitation without incubation and further precipitation after 4 and 24 hours, (4) 2 months after inoculation, precipitation much decreased, (5) 4 months after inoculation, results similar to (1). Thus the malarial reaction occurred approximately one month after inoculation, 20 days after the beginning of the fever and about a fortnight after its subsidence the reaction tended to return to normal after about 2 months. It is not suggested that the above results have any practical application but they may be compared with those obtained in certain other diseases.

T E Osmond

Dr. GRAM W. Over het recidiveren van malaria (Concerning Malaria Relapses *Nederl Tijdschr v Geneesk* 1949, June 4, v 93 (ii), No 23, 1849-60) English summary

In a prisoner of war camp in Batavia there were collected in the course of three years 651 cases of malaria. The disease did not occur normally in that area so that it was possible to watch relapses without the complication of new infections. There were three main groups —

1. The Timor group consisting mainly of incompletely treated Australian troops. They mostly had benign tertian infections.

2. The Flores group consisting of Dutch troops very heavily infected, many with mixed benign tertian and subtertian infections but mostly the former.

3. The remainder — a very varied group.

These patients were carefully watched. Most of the subtertian relapses took place within four weeks and there were none after nine weeks. Of the benign tertian relapses the greatest number 72 per cent, occurred within a month of the last day of treatment, 93 per cent occurred within two months. After two months the number of relapses fell steeply a fact to be borne in mind in assessing therapeutic and prophylactic measures. The peak of relapses occurred in the third week and the peak observed at seven months by James was not seen in this series.

A number of patients were followed up for many months some up to three years. Of these 40 had one 20 two 7 three 8 four 6 five 2 nine and 1 twelve relapses. A series of relapses could terminate quite suddenly or the interval could gradually increase till they ended or in some cases malaria parasites persisted in the blood without causing any clinical manifestations.

No patient continued to have parasites in his blood or to relapse for more than a year and a half.

Among the 85 subtertian cases there were six deaths but many fewer relapses than among the benign tertian cases.

Therapeutic material was very scarce but in spite of the difficulties controlled trials were carried out.

The first trials were directed towards economy in quinine. The original dose of 1.2 g. per day for seven days was reduced to 1.2 g. for five days (benign tertian cases only) with a decrease in the relapse rate. A few cases were treated with 1.2 g. for six days only. The small dose was apparently quite successful.

Subsequently the three forms of treatment were used on patients taken in rotation.

1. Mefenamic acid — 100 mgm three times daily for five days.

2. Quinine — 1.2 g. daily for five days.

3. Quinine as above immediately followed by plasmoquine 20 mgm. three times daily for five days.

The results from atebria were apparently the worst as judged by relapses, but there were only 18 cases drawn from the most heavily infected group supplies ran short after these had been treated. There was no statistically significant difference between the relapse rates of the three groups. The only advantage was apparently with the group given plasmoquine none of whom had more than four relapses.

A. L. W. 407

RAYNAUD R. MINICONI P & CHEVROT L. Les états méningés du paludisme [Meningeal Conditions in Malaria.] *Algérie Méd* 1947 Mar No. 7, 15-21 16 refs.]

Three groups of meningeal manifestations can be distinguished in malaria infections: (1) meningeal reaction without clinical symptoms; (2) meningeitis complicating a more or less typical attack of malaria; (3) malarial meningitis in which the meningeal symptoms mask completely the basic malarial infection. The recognition of the first group depends upon an examination of the cerebrospinal fluid which shows a more or less marked lymphocytosis. This is of frequent occurrence in acute attacks of malaria. It may account for severe headaches, neuralgias, neuritis and paralysis of cranial nerves that are listed among the complications of malaria.

In the second group the involvement of the meninges has objective signs, rigidity of the neck and Kernig's sign, with lymphocytosis and increased albumin in the cerebrospinal fluid. These meningeal signs are superimposed on more or less typical symptoms of malaria.

Malaria meningitis is much rarer. Here meningeal symptoms are alone in evidence. The sudden onset and the absence of all the usual symptoms of malaria make the diagnosis extremely difficult. It is only in malarious countries that one would consider the possibility of a malarial infection. Lumbar puncture may reveal a normal cerebrospinal fluid in the early stages. Later the fluid may become opaque with a predominance of polymorphonuclear leucocytes. In the blood *P. falciparum* is almost always in evidence. In countries in which relapsing fever occurs the differential diagnosis may be further complicated as attack of relapsing fever may be ushered in with meningeal symptoms.

The authors describe cases illustrative of each of these three groups of meningeal manifestations in malaria.

Verma H. 412

RAYNAUD R. MINICONI P & CHEVROT L. Un cas de méningite palustre [A Case of Malarial Meningitis.] *Algérie Méd* 1947 Mar No. 3 233-5

A woman aged 33 after a few days of malaise, loss of appetite and slight fever suddenly lost consciousness and was admitted to hospital. She presented psychic disturbance which was attributed to alcoholism. Her temperature was 38°C. The following day she was found to be in a state of complete coma with a temperature of 41°. She presented a typical meningeal syndrome: muscular hypertony, rigidity of the neck and Kernig's and Brudzinko signs. The tendon reflexes were active, the light reflexion of the pupils was normal. Lumbar puncture showed a clear cerebrospinal fluid. The signs of meningitis were so unequivocal that intramuscular injection of penicillin and Salicylénol alternately were commenced without delay. The temperature fell but the nervous symptoms were aggravated. The following day the laboratory reported the presence of *P. falciparum* in the blood. Quinine treatment procured a rapid recovery though the psychic disturbance persisted for three or four days.

Verma H. 412

BENHAMOU, E, ALBOU & LEONARDON Les facteurs de pronostic dans l'accès pernicieux [Factors of Prognostic Significance in Pernicious Attacks of Malaria] *Algérie Méd* 1947, Mar, No 3, 238-45

A study of 55 cases of pernicious *P. falciparum* malaria have led the authors to the conclusion that prognosis cannot be based on any single sign such as the depth of the coma the intensity of anaemia or the urea content of the blood but that a combination of signs may afford a guide. The duration of coma before the institution of treatment is of great significance. The combination of high blood urea, coma, and high parasite density is a grave omen. If the complement content of the blood falls to and remains at zero an early fatal result may be expected.

Recovery from a pernicious attack may leave the patient very susceptible to serious secondary infections to prevent which the authors recommend treatment with very large doses of penicillin

Norman White

BRUCKNER, Sylvia & LĂZĂRESCU, Mircea Sindrom encefalitic în cursul malariei cronice [Encephalitic Syndrome in Chronic Malaria] *Rev Științelor Medicale* Bucharest 1948, Nov-Dec, v 37, Nos 11/12, 625-31 [15 refs] French summary

The following is a translation of the authors' summary —

After reviewing the various nervous complications of malaria the authors describe two cases with encephalitic features appearing in the chronic stage of *P. falciparum* infection.

Attention is drawn to the pathological anatomy, the pathogenesis and the importance of aetiological diagnosis in such nervous cases.

H J O'D Burke-Gaffney

PETA, T Sul significato e l'origine delle emorragie petecchiali nei soggetti malarici [Significance and Cause of Petechial Haemorrhages in Malaric Patients] *Riv di Malarologia* 1948, Aug, v 27, No 4, 171-8 [19 refs] English summary (5 lines)

The author describes eight patients, all from Matemma or Gallabat, Asmara who were suffering from malaria and who had petechiae on the trunk or limbs or both. Though malaria may cause haemorrhagic lesions in severe infection good evidence is produced that the petechiae in the cases in question were due to a deficiency of vitamin C in the inadequate diet.

Norman White

HENRY, A F X De la sérologie palustre à la thérapeutique du paludisme chronique [Serology in the Treatment of Chronic Malaria] *Bull Acad Nat Méd* 1949 v 133, Nos 9/10, 193-6

— Les bases biologiques du traitement des formes prolongées de l'infection palustre [Biological Bases of the Treatment of Prolonged Forms of Malaria Infection] *Ibid*, 196-8

— Quelques directives pour le traitement du paludisme subaigu et du paludisme chronique [Suggestions regarding the Treatment of Subacute and Chronic Malaria] *Ibid* 198-201

The author enlarges on the value of the melano-flocculation reaction which bears his name, during the treatment, as well as in the diagnosis, of malarial infections.

Chronic malaria is a general, focal and organic disease characterized above all by a deficient oxygen supply to tissues with all the damage that such a state of affairs may produce. Internal secretory glands and reticulo-endothelial tissues are specially involved. Treatment should have one of two ends in view. If the patient can leave his malarious environment the aim should be the total eradication of the infection, not always easy to obtain. In other circumstances the aim should be the restoration of a state of premunition in which the patient tolerates his infection with impunity.

The author's methods for the catalytic premunotherapy of subacute and chronic malarial infections have been previously described (see this Bulletin, 1948, v 45, 756).

Norma White

HERRING E. R., PATT H. M. & LEAVITT H. J. Tolerability Studies of some New Antimalarial Drugs. *J. National Malaria Soc.* 1948 Dec., v 7 No. 4 322-9 3 figs.

This experiment was designed to test the tolerability or acceptability of four of the newer antimalarial drugs of suppressive value as compared with quinaquine [mepacrine] and a placebo (lactose). Nine hundred and fifty-five volunteer marine recruits were the subject of experiment. The value of the drugs as suppressants was not an object of the study. The drugs tested were given once a week, these drugs, and their weekly doses, were: SN-6911 0.6 gm. SN-7819 [Chloroquine] 0.3 gm. SN-8137 Oxychloroquine 0.6 gm. SN-11437 [metanilamido-5-chloropyrimidine] 0.0 gm. quinaquine 0.24 gm. The drugs and the placebo were all given in green tinted capsules after a mid-day meal. None knew which of the six preparations he was given.

After each drug administration the men were interviewed concerning the results of the previous dose and asked if they had any complaints. All complaints were recorded.

Criteria of tolerability were (a) refusal to accept the drug after it had been taken at least once (b) complaints attributable to the drug (number of individuals complaining) (c) sick bay admissions during the course of the experiment (d) rifle firing scores achieved during the experiment. The observations lasted six weeks.

Quinaquine was productive of most complaints and refusals to continue. SN-6911 was also significantly inferior to the other three drugs. SN-7819 (chloroquine) was the best tolerated causing almost as few complaints as did the placebo (34 complaints of various symptoms were attributed to lactose). Motor co-ordination as reflected by shooting scores was unaffected by the drugs.

Norma White

WIJCKEL C. W. F. The Efficacy of Quinaquine and Quinine in the Treatment of *Plasmodium malariae* Infections. *Documenta Neerlandica et Indonesica de Morbis Tropici.* Amsterdam, 1949 Mar v 1 No. 1 83-6 4 graphs.

The author describes his experience in the treatment of *P. malariae* infections with quinine and quinaquine [mepacrine]. His patients were neurosyphilitics who had been infected, for the most part, by intravenous subinoculation. He compares his results with those obtained by VAN DER EYDEN (this Bulletin, 1948 v 45 699) who administered quinine in much larger doses and for a much longer period than does the author. He concludes that in cases of quartan malaria the results of treatment with 1 gm. of quinine a day are certainly as good as those with 2 gm. a day. The use of larger doses should be banished. Symptoms of toxication of any events are thereby averted. Quinine when given in proper doses kills many parasites but not all. A certain

amount of antigen comes into contact with the body cells. This stimulates to enhanced phagocytosis and to the secretion of antibodies. When these are present in sufficient numbers, the surviving parasites are killed off. Quinine should therefore be given in such dosage that the cells are not damaged."

Norman White

CLARKE G H V. A Case of Mepacrine Dermatitis [Memoranda] *Brit Med J* 1949, July 9, 58

HILL, E & AMATUZIO, D S. Southwest Pacific Vivax Malaria. Clinical Features and Observations concerning Duration of Clinical Activity. *Amer J Trop Med* 1949, Mar, v 29, No 2, 203-14, 3 figs [40 refs]

Between July 1, 1945 and April 1, 1948, 328 patients with *P vivax* infections that had been acquired in the south-west Pacific were studied in the Veterans' Hospital, Minneapolis. All had received suppressive mepacrine medication while in the Pacific, this had usually been discontinued on their return to the United States. Since discharge from the Service all had resided in a non-malarious region of the United States.

Chills, fever and malaise ushered in the attack in almost all cases. Other prodromal symptoms were present in 46 per cent. Enlarged spleen was noted in 37.6 per cent of patients. Anaemia was not a marked symptom, the patients were well nourished. The haemoglobin level was not related to the number of attacks.

One hundred and sixty-nine patients were treated with mepacrine, 62 with chloroquine. Mepacrine dosage was 0.2 gm every six hours for five doses, then 0.1 gm thrice daily for six days. Chloroquine diphosphate dosage was 1.0 gm followed by 0.5 gm six hours later, then 0.5 gm on each of the second and third days. The relapse rates of comparable groups of patients treated with mepacrine and chloroquine were 60 and 56 per cent, respectively. The relapses after chloroquine treatment occurred much earlier. Chloroquine was in no way more effective than mepacrine. There were no symptoms of toxicity with either drug.

A study of the duration of infection was made in 155 patients, none of whom was treated with drugs likely to eradicate the infection such as quinine-plasmoquine or pentaquine-quinine. Infections were terminated in the first year in 24.5 per cent, in the second year in 52.9 per cent, in the third year in 18.3 per cent. Attacks were still occurring in the fourth year in 4.3 per cent. All the patients probably harboured multiple strains of Pacific *P vivax*.

Norman White

CULWELL, W B, COOPER, W C, WHITE, W C, LINTS, H A & COATNEY, G R. Studies in Human Malaria. XX. The Intramuscular Administration of Chloroquine. *J National Malaria Soc* 1948, Dec, v 7, No 4, 311-15 [10 refs]

Chloroquine was given intramuscularly to 16 young male volunteers who had been infected with the Chesson strain of *P vivax* by mosquito bite. It was given as the hydrochloride in sterile unbuffered aqueous solution containing 45 mgm of the salt (40 mgm base) per ml. The pH of the solution was 5.6. Treatment of each attack was begun on the third day of patent parasitaemia if the oral temperature had reached 102°F by 8 a.m. on that day. Three systems of dosage were used: single injection of 200 mgm (base), two injections of 200 mgm each, four-hour interval, single injection of 300 mgm. Injections were made in the gluteal muscles.

The highest plasma concentrations of chloroquine were obtained 15 minutes after injection, in all but four cases. The highest concentration observed in any subject was 490 mgm. per litre. Clinical response was rapid in all cases. There were no toxic reactions.

Where oral administration of chloroquine is not possible treatment can safely be begun by the intramuscular injection of 200 mgm. of base repeated after four hours if necessary. Treatment by mouth, to complete a course of 1.5 gm. of base in three days should be started as soon as practicable. *Norman White*

GIOVAXARDI, A. SEFCLORI, P. & DE NEGRI U. Il "Palusil" (N^1 -p-cloro(enil- N^3 -isopropil-bisguanide) nella terapia della malaria.—Nota II. Effetti del trattamento della malaria naturale da *Plasmodium vivax* (Paludrine (Proguanil) in the Treatment of Malaria. Note II. The Effects of Treatment of Naturally Acquired *P. vivax* Infections.) *Riv. di Malariologia*. 1949, Oct. v 27 No. 4 191-200 1 graph. English summary (7 lines).

This is a progress report of an investigation the authors were making on the value of palusil, Italian paludrine [Proguanil] in the treatment of malaria. Three hundred and twenty three patients suffering from *P. vivax* malaria were treated 201 from the Province of Venezia and 122 from the Province of Roma. The results were satisfactory. Various doses were prescribed. The best results were obtained with 0.3 gm. a day for 15 days followed by the same dose once a week for five weeks. Among 30 patients so treated only one relapsed on the 20th day after the end of treatment. The reduction in the size of enlarged spleens began after the first day of treatment. In more than 70 per cent of the patients treated with palusil the spleens were normal in size after the end of treatment. The drug was generally given after food and was well tolerated.

Blood counts in ten patients with chronic infections showed a marked increase in the number of red cells that resulted from treatment together with a return to normal of the differential leucocyte count. *Norman White*

WHITE W. C., COOPER, W. C., COATNEY G. R., CULWELL, W. H., LINTS H. A. & YOUNG, M. D. Studies in Human Malaria. XXI. The Cure of St. Elizabeth Strain *Vivax* Malaria by Pentamidine-Quinine administered during Acute Attacks or during Latency. *J. National Malaria Soc.* 1949, Dec. v 7 No. 4 316-331 fig. 10 refs.

Fifteen young white male volunteers were infected with the St. Elizabeth strain of *V. vivax* by mosquito bite. This strain produces an infection with a latent period of from 6 to 9 months between the early primary attack and the first relapse. All 15 men developed early primary attacks which became patent 11 to 14 days after the mosquito bites. The men were divided into three groups of five each. On the third to fifth day of patency the men of Group A were treated with concurrent pentamidine and quinine. The men of Groups B and C were treated with quinine alone. The doses (base) were: pentamidine 15 mgm. every 6 hours for 14 days; quinine 0.5 gm. every 6 hours for 14 days. The acute attacks were alleviated promptly in all cases.

Four months (120 days) after infection the following treatment was given: Group A none; Group B concurrent pentamidine and quinine; Group C quinine alone.

The men of Groups A and B had no late attack of malaria through 18 months of observation. All the five men of Group C developed late relapses 184 to 280 days after the original infection. These late relapses were terminated with pentamidine and quinine and no subsequent attacks developed during the following 18 months.

During the 15 courses of combined pentaquine-quinine therapy the complaints were abdominal cramps, 14, epigastric tenderness, 9, nausea, 6, anorexia, 4, nausea and vomiting, 3, tinnitus and dizziness, 5, urticaria, 2, fine macular rash, 1, fine papular rash, 1, tremor, 1, blurring of vision, 1. Only one man had no complaints.

During the 15 courses of quinine alone the complaints were abdominal discomfort, 2, epigastric tenderness, 1, nausea, 3, tinnitus, 3, dizziness, 5, urticaria, 1, fine macular rash, 1, diarrhoea, 1.

Concurrent pentaquine and quinine have clear-cut curative properties in the treatment of infections with the St Elizabeth strain of *P vivax*.

Norman White

GULLAND J M & MACEY P E Synthetic Antimalarials Part XXXVIII 2-(6'-quinolylguanidino)-4- β -diethylaminoethylamino- and 4-(6'-quinolylguanidino)-2- β -diethylaminoethylamino-6-methylpyrimidines. *J Chem Soc* 1949 May 1257-9

CROWTHER A F CURD F H S DAVEY D G & STACEY G J Synthetic Antimalarials. Part XXXIX Dialkylaminoalkylaminoquinoxalines. *J Chem Soc* 1949 May 1260-71

CURD F H S DAVEY D G & STACEY G J Synthetic Antimalarials Part XL The Effect of Variation of Substituents in 2-Chloro-3- β -diethylaminoethylaminoquinoxaline *J Chem Soc* 1949, May 1271-7

GAGE J C Synthetic Antimalarials Part XLI Physicochemical Studies on Quinoline Derivatives. *J Chem Soc* 1949 June 1458-62 1 chart

MATHIESON D W & NEWBERY G Contributions to the Chemistry of Synthetic Antimalarials Part VIII Aromatic Carbinolamines *J Chem Soc* 1949 May 1133-7

KLOPPER, S The Suppressive Action of Paludrine in Benign Tertian (Vivax) Malaria *Documenta Neerlandica et Indonesica de Morbis Tropicis* Amsterdam 1949, Mar, v 1, No 1, 50-54, 4 figs

These carefully controlled observations were made in Wormerveer, a town of 10,500 inhabitants in the Province of North Holland. Paludrine [proguanil] once a week was given to 607 adults and to 566 elementary school children from the middle of April to the middle of July, when malaria is most prevalent. Adults received 100 mgm., children 50 mgm., a week. A second group of 510 adults and 474 children received no paludrine but were as carefully observed as the first group. During the period of drug administration the incidence of malaria in the paludrine group was markedly lower than among the control group, the curve falling to zero at the end of May. After the cessation of paludrine the malaria incidence of the treated group rose rapidly, the total malaria morbidity of that group for the season being about equal to that of the general untreated population of Wormerveer. Paludrine delays the clinical attack.

Sixty-four patients who had suffered from one or more malaria relapses in 1946 were each given a tablet a week, 32 received 100 mgm paludrine the remainder sodium bicarbonate. Those who took paludrine regularly had no further relapse during the period of observation. 12 of the 32 patients receiving sodium bicarbonate suffered clinical relapses during this period.

Norman White

HOFFMAN J & VAN RIEL, J. Bilan d'un an de lutte antimalarienne par pyréthrace des habitations. [Appraisal of the Results of a Year's Antimalarial Work by Treatment of Dwellings with Pyrethrum.] *Ann. Soc. Belg. de Méd. Trop.* 1948, Dec. 31 v. 28 No. 4 387-94

In Lenda, a mining settlement of the *Gauts Lacs Africains* Mining Company of the Belgian Congo, an experiment to control malaria by dusting dwellings with pyrethrum powder was begun in the middle of May 1947. The settlement was highly malarious. Imported labour recruited in non malarious localities suffered very severely. *A. gambiae* and *A. funestus* were very abundant. It was often possible to capture 5 000 or more adults of these species in a single dwelling. The houses were dusted with fresh and finely ground pyrethrum flowers. Dustings were done twice weekly, 40 gm. of powder being used on each occasion for each house. After some months when anophelines could no longer be found the amount of powder used was reduced by half.

The results were spectacular. The infant mortality rate was 10 per 1 000 live births during the first half of 1947. It fell to 8.6 in the second half of that year and to 5.2 in the first half of 1948. No such fall was evident in control untreated areas. The mortality rate of older children was 4.3 per thousand during the 12 months preceding the experiment. It fell to 0.9 during the first 12 months of the pyrethrum treatment.

Previous to the experiment malaria parasites could be found in the blood of infants within a few weeks of birth. After a year of treatment of the camps malaria parasites were found in only one of the 420 infants under one year of age examined.

The rare cases of malaria that are now seen are either relapses or infections contracted elsewhere.

Norma HALL

ETNERINGTON D. DDT as a Residual Insecticide against *Anopheles maculipennis*. [Correspondence.] *Nature* 1949 July 2, 32.

The author refers to Meirhead THOMSON's findings in Africa this Bulletin 1949 v. 46 439 that DDT had an irritant effect on *A. phaeocephalus* in houses. The present author had the impression in Italy in 1944-45 that *A. maculipennis* var. *labialis* reacted similarly when DDT spraying (5 per cent in kerosene) was used against "domestic" resting places. It seemed to have repellent rather than a lethal effect.

He had recorded this experience and its possible implications with proposals for its investigation in an official report but Service conditions precluded the matter being followed up and the necessary experiment which he suggested could not be completed. He points out that Meirhead THOMSON's independent findings with *A. gambiae* support his own earlier observations and he now adds that he considers that the value of DDT as a malaria control measure is also open to doubt in areas where *A. maculipennis* var. *labialis* is the vector. [No experience with *G. morsitans* is recorded.]

H. J. ORD 1 & 4 lines

DE VEGT, L. Larvicida a base di polvere di sughero di DDT. Cork Powder and DDT as a Larvicide. *Riv. di Malariologia* 1948 Oct. 27 No. 5 213-20. [En. lish summary (8 lines)]

Cork powder, by product of the cork industry, consists of amorphous granules from 1 to 47 μ in diameter when applied to the surface of water in quantity not less than 150 gm. per square metre kills anopheline larvae therein by asphyxia. The large quantity required precludes its use as a practical larvicide.

If the cork powder be immersed in kerosene containing 5 per cent DDT—1 kilogramme of powder in a litre of kerosene—the resultant product has a potent larvicidal action against both *Anopheles* and *Culex* when sprayed on water in quantity not less than 25 gm per square metre. In none of the experiments did this larvicide cause any damage to fish, including *Gambusia*. The low cost of cork as a waste product makes this a cheap way of destroying larvae.

Norman White

McARTHUR, J. Malaria in Borneo. An Account of the Work of the Malaria Research Department, North Borneo, 1939-42. 250 mimeographed pp. 76 figs [Numerous refs.] 1948

A complete account of the investigations discussed in this *Bulletin* 1947, v. 44, 788

HAAS, V. H., WILCOX, Aimee & COLEMAN, Nell. Modification of *Plasmodium gallinaceum* Infections by certain Tissue Extracts. *J. National Malaria Soc.* 1949, Mar., v. 8, No. 1, 85-99 [17 refs.]

The fact that various laboratory mammals were refractory to *P. gallinaceum* infection suggested to the authors that some substance or substances inimical to the parasite might be present in their tissues. Extracts of various mammalian tissues were therefore prepared and their effect on *P. gallinaceum* was tested *in vitro* and *in vivo*. Since extracts prepared from chickens in a similar way also showed some inactivating effect it appears that a number of other factors are associated with resistance to infection. In the *in vitro* test, with suitable controls, it was found that exposure to saline extracts of pooled mouse tissues inactivated to some extent blood and exoerythrocytic forms of the parasite, also sporozoites as judged by the resulting infection rate in chick embryos inoculated by various routes. Extracts of spleen of various mammals and of chickens affected sporozoites, exoerythrocytic and especially erythrocytic forms of *P. gallinaceum* so that the infection rate in chickens inoculated with these parasites was greatly reduced. Bovine spleen extracts were, however, toxic to chickens, causing necrosis and gangrene at the site of subcutaneous inoculation [the actual site of inoculation of the parasites and extracts is not stated, but if inoculation of both was made at the same spot the necrotic action on tissues mentioned would doubtless affect the injected parasites]. An extract from chicken and bovine blood showed similar properties and toxicity but in lesser degree than those from spleen. It is possible that red or white blood cells present in the spleen were the source of activity. An unsuccessful attempt was made to characterize the active substance, it appeared, however, to be protein.

J. D. Fulton

TERZIAN, L. A., STAHLER, N. & WEATHERSBY, A. B. The Action of Antimalarial Drugs in Mosquitoes infected with *Plasmodium gallinaceum*. *J. Infect. Dis.* 1949, Jan.-Feb., v. 84, No. 1, 47-55, 1 fig.

The present investigation is a continuation of earlier studies by the senior author and Weathersby [this *Bulletin*, 1948, v. 45, 767, 1949, v. 46, 609] who indicated that a correlation existed between the activity of prophylactic drugs in *P. gallinaceum* infections of chickens and in infected mosquitoes. Those substances which protected the chicken host against sporozoite infections also arrested oocyst development in the mosquito, whereas suppressive drugs exerted no such effect. A prophylactic drug in the invertebrate host is defined as one which is effective against presporozoite stages and prevents formation of the latter.

About 100 to 150 *Aedes aegypti* or *Anopheles quadrimaculatus* were fed on each different concentration of drug prepared in 4 per cent. sugar solution. Mortality was correlated with the level of drug concentration. Feeding on the drug solutions was begun 48 hours before an infective blood meal and continued during the course of infection. Development of oöcysts was followed by dissection of the hosts and intensity was gauged by their number and that of sporozoites present. Infectivity of sporozoites was tested by inoculation to chickens.

A number of drugs which act as suppressive agents in the vertebrate host including quinine, atabrin (mepacrine), plasmoquine (pamaquin) and others had no effect on oöcyst development or sporozoite production in the mosquito whereas sulphadiazine, metachloridine (SN 11 437, 6-metanilamido-5-chloropyrimidine) and paludrine which are prophylactic in the chicken prevented oöcyst development and sporozoites were therefore absent. This was found by calculation to be more than a chance relationship and the results confirm the earlier findings of the author. Similar relationships held in the case of *P. falciparum* and its vector *A. quadrimaculatus*. In this case paludrine was the only active drug. The application of these methods to the search for drugs prophylactic in human malaria is obvious and has the advantage that if levels of drug are adequate effects can readily be judged by mosquito dissection followed by microscopical examination. Photomicrographs of mosquito stomachs taken seven days after an infective blood meal illustrate this fact. It was noted that the effect of prophylactic drugs was exerted late in oöcyst development and the drugs could therefore be withheld for some days after an infective meal and still show activity. A particular phase in the oöcyst developmental cycle appears to be specially vulnerable to drug action. The infectivity of developed sporozoites was not affected except by plasmoquine. The action of metachloridine and sulphadiazine but not of paludrine was antagonized by para-aminobenzoic acid and this suggests that the two former substances interfered with the para-aminobenzoic acid metabolism of the parasite as does sulphadiazine in the case of bacteria. J. D. Fildes

KNOPPERS, A. T. Twofold Quinine Resistance of *Plasmodium gallinaceum* Induced by Regular Administration of the Drug. *Documenta Neerlandica et Indonesica de Morbis Tropicalibus*. Amsterdam, 1949 Mar 1, No. 1, 55-63, 40 refs.

The production of strains of avian, monkey and human plasmodia (*P. vivax*) resistant to various antimalarial drugs has been reported in this *Bulletin* from 1942 onwards. The present author described previously a strain of *P. gallinaceum* with two-fold resistance to quinine (this *Bulletin*, 1949, 45 [56]) of which further details are now given. The method employed was to treat seven-day-old chicks orally with 10 mgm. per kilo. of the drug and to transmit the treated strain by blood inoculation into fresh hosts. At the end of 16 weeks treatment the dose of quinine was doubled and after 28 weeks a two-fold resistance was established and could not be increased. The resistance persisted when quinine was withheld for about 25 weeks but was slightly diminished after the first mosquito passage though not on subsequent passages. Resistance was also shown to mefloquine and to a lesser degree to mefloquine or quinoline. There was no resistance to atabrin, mepacrine, paludrine (pregnam), chloroquine or sulphamerazine. On the other hand the strain was more than usually sensitive to pamaquin, plasmoquine, pentamidine and isopentaquine. On passage by means of erythrocytic film resistance was retained. There is at present theoretical discussion on the significance of these results. J. D. Fildes

SICCA, G T L'azione del Farma 01015 (Paludrina) sulla infezione da *P. gallinaceum* [The Action of Paludrine [Proguanil] in *P. gallinaceum* Infections] *Riv di Malarologia* 1948, Oct, v 27, No 5, 201-12 [13 refs] English summary (3 lines)

This is a record of experiments to determine the efficacy of an Italian preparation of paludrine hydrochloride [proguanil] in the treatment of *P. gallinaceum* infections. Chickens were used. In one group of birds, infection was produced by the injection of 0.2-0.25 cc of citrated blood, taken from a bird in the acute stage of the infection, into the pectoral muscle. In a smaller group 0.4 cc of an emulsion of brain tissue of an infected bird in normal saline was injected intramuscularly. All the untreated control birds of less than 120 gm weight inoculated with infected blood died during the acute phase of the attack, no exoerythrocytic forms were found at autopsy. Some of the heavier birds, from 300 to 550 gm weight, survived the acute phase to die later during a recrudescence, with exoerythrocytic forms in the internal organs. Most of the birds infected with brain emulsion containing exoerythrocytic forms died during the acute attack with erythrocytic forms in the blood, the acute phase began from 7 to 12 days after inoculation.

Paludrine was given by mouth at different stages of the acute attack. A dose as small as 2 mgm a day for 3 days had a definite influence in 4 chicks, the high parasitaemia was much reduced, and death was delayed to the 19th to 23rd day after inoculation. Four birds varying in weight from 110 to 400 gm who were given 5 mgm a day for 6 days recovered from the infection. One of these was killed on the 63rd day after inoculation, a very few parasitized red cells were found but there were no exoerythrocytic forms.

To test the prophylactic value of the drug, 7 birds inoculated with infected blood received 2 to 5 mgm paludrine a day for 6 days, beginning 4 hours after the inoculation. These birds were killed at different periods, when the corresponding control birds were suffering from an acute attack or, in two cases, on the 48th and 63rd days after inoculation. In only one living bird were parasites found in the peripheral blood, they were few in number and found on only three consecutive days, 30 days after inoculation. In 2 birds killed on the 16th and 48th day after inoculation a very few infected red cells were found. No exoerythrocytic forms were found in these birds. The experiments confirm the remarkable therapeutic and prophylactic activity of paludrine against *P. gallinaceum*.

Norman White

CANTRELL, W, KELSEY, F E & GEILING, E M K Sulfonamide Blood Levels in Prophylactic Tests against *Plasmodium gallinaceum* *J Infect Dis* 1949, Jan-Feb, v 84, No 1, 32-40

Certain sulphonamides have been found active in human, monkey and avian malaria. Although the hope was not realized, it appeared probable that a member of the group would be found to act as a prophylactic in human malaria. The experiments described here were undertaken to gain information on the blood levels of drug required to protect chickens from intravenous infection with sporozoites of *P. gallinaceum*. The drugs were given in the diet to chickens kept on a three-hour dark and light schedule. At the end of a light and dark period blood samples of 0.02 ml were collected daily or every second day for the determination of sulphonamides, generally in pooled samples, by BRATTON and MARSHALL's method (*J Biol Chem*, 1939, v 128, 537). Smears were examined for the presence of parasites and inoculation of blood to fresh hosts was used to detect the presence of latent infection in treated birds. In all, 13 experiments were performed in which groups of 5 chickens were given various

drug diets and 5 to 10 chickens served as controls in each case. Protection was afforded by sulphapyrazine, sulphadiazine, sulphamethazine and sulphamerazine in that order, 50 per cent of the chickens being protected by blood concentrations respectively of 2.6, 3.1, 4.7 and 7.0 mgm. per 100 ml. There was a correlation between the protection afforded and the persistence of drug in the blood. Besides those mentioned 61 other sulphonamides were tested for prophylactic activity of which 19 were effective in the doses used, most however being inferior to sulphadiazine in this respect. The disadvantages of the drug diet were that the amount of drug ingested could not be accurately assessed and wide variations occurred in the blood-levels of chickens receiving the same diet. Differences in the rate of disappearance of drugs from blood were also noted. The protective power of the sulphonamides depended on other factors besides blood concentration. Some which failed to protect caused considerable delay in the appearance of the parasites. The relation of structure to activity and drug concentration in the blood is discussed. J. D. FALKER

GREENBERG, J. Hypersensitivity to Sulphadiazine of a Chloroquine-Resistant Strain of *Plasmodium gallinaceum*. J. National Malaria Soc. 1949 Mar. v. 8 No. 1 80-84 1 fig.

The author and his colleagues (this Bulletin 1949 v. 46, 119) produced evidence to show that there was a synergism between chloroquine (proguanil) and sulphadiazine when used to treat *P. gallinaceum* infections of chickens. He has now investigated the possibility that a chloroquine-resistant strain of this organism might show increased sensitivity to sulphadiazine. Such a strain was therefore prepared by treatment of chicks with 0.03 mgm. of chloroquine hydrochloride per gm. of body weight once or twice during each passage and resistance was 16 to 2 fold from the 18th to 41st passage. During earlier passages and up to the 41st the resistant strain was at its maximum 8 times more sensitive to sulphadiazine than the normal. In later passages when chloroquine treatment was discontinued hypersensitivity to sulphadiazine persisted. As shown by others, the resistant strain was normally sensitive to quinine, chloroquine and pamaquin (plasmoquine). The author suggests that his findings indicate an attack by the two drugs in question on different enzyme systems in the parasite. They are however at variance with the findings of HINSHOP and MCCONNACHIE (this Bulletin 1949 v. 48, 119) who produced resistance to sulphadiazine in *P. gallinaceum* after 1 month treatment which was unaffected by mosquito passage and involved the simultaneous production of resistance to paludrine, proguanil. A paludrine-resistant strain after months of contact with the drug was also resistant to sulphadiazine. These conflicting results of the different authors require further investigation. J. D. FALKER

McGURR, R. B. Infection of Mammalian Erythrocytes by the Avian Malaria Parasite, *Plasmodium lophurae*. Proc. Soc. Exper. Biol. & Med. 1949 May v. 1 No. 1 87-91 1 fig.

Heavy infections of *Plasmodium lophurae* can be obtained in chicken embryos also and the author refers to investigation in progress under publication. Mammalian erythrocytes will survive for varying periods if introduced intravenously into the chicken embryo. Dog, rabbit and guinea-pig cells do not adapt themselves well to transfer but human and murine erythrocytes retain their morphology for considerable periods. Accordingly the author infected 10-day chick embryos with *P. lophurae* (24th passage strain in embryos) and ten days later inoculated them intravenously with 0.1 cc. of twice washed erythrocytes. The parasites only

rarely invaded human corpuscles but mice cells were readily parasitized (up to 0.1 per cent). The embryos usually showed a proportion of 1/2 mammalian to avian erythrocytes. The foreign cells were invaded after 12 hours, pre-segmenting forms were seen after 32 hours and mature schizonts in 36 hours. Band forms occurred, the pigment was in small golden-brown spheres and 5-11 merozoites in a rosette were produced. The mouse cells became enlarged but not stippled. No gametocytes were found.

In vitro, whole mouse blood plus infected chick embryo blood cultured by Trager's method [this *Bulletin*, 1947, v 44, 1046] showed a similar invasion of the mouse erythrocytes by the parasite.

[This paper appears to the reviewer to be of considerable importance and the results indicate that the method will help in the solution of a number of problems in immunity, in the obscure subject of gametocyte production and in the general relationships of the different species of *Plasmodium*. Many queries suggest themselves: could the infection continue if the blood were returned to mice, would continued passage under these conditions increase the susceptibility of the mouse corpuscles to infection and, finally, how would other parasites react to such changes in environment?] P C C Garnham

BLACKWATER FEVER

RAOULT, A., AUFFRET, C., TANGUY, F. & MARTIN, M. L'acide ascorbique dans le traitement de la fièvre bilieuse hémoglobinoïdique [Ascorbic Acid in the Treatment of Blackwater Fever] *Bull Méd de l'Afrique Occidentale Française* 1948, v 5, No 1, 161-6.

Extremely low blood ascorbic acid levels were found in cases of acute and chronic malaria. In the blood of six out of nine patients who developed blackwater fever only immeasurable traces could be detected. Accordingly, persons suffering from this disease thereafter were given large doses of vitamin C, 200 mgm intravenously every four hours, in addition to their other treatment with good clinical results.

It is known that fever causes increased utilization of ascorbic acid and lowered blood and tissue levels, and, further, that ascorbic acid is a factor in maintaining corpuscular integrity by inhibiting liberation of histamine and by its antagonistic action to hyaluronidase. The authors consider that a critical lowering of ascorbic acid levels may be a major factor in precipitating the onset of blackwater fever and that this catastrophe might be prevented by administering large doses of vitamin C to all patients with malaria.

Dean A. Smith

TRYPANOSOMIASIS

CONGO BELGE FONDs REINE ELISABETH POUR L'ASSISTANCE MEDICALE AUX INDIGÈNES DU CONGO BELGE RAPPORT SUR L'ACTIVITÉ DURANT LES ANNÉES 1946 ET 1947 [DE BRAUWERE, P.] *Maladie du Sommeil* [Sleeping Sickness] pp 50-67, 1 diagram & 2 maps

For the preceding Forearm Report, covering the years 1939 to 1945, see this *Bulletin*, 1948, v 45, 816. The present Report as a whole is reviewed separately [*ibid* 1949, v 46, 785]. In 1946 and 1947 the measures against sleeping sickness continued to consist mainly of mass treatment and

chemoprophylaxis with only slight attention to entomological control. The situation continues to improve as shown by a further decrease in the Index of New Cases. In the Kwango Sector now the main scene of operations, the index was 0.47 per cent (2,862 new cases) in 1948 and it had fallen to 0.18 per cent (974 new cases) by 1947. Chief credit for the improvement is accorded to the procedure of mass prophylaxis, which is being increasingly carried out with pentamidine or propamidine replacing suramin for this purpose.

Arsenic-resistant infection has been a considerable problem, and the report refers to the discordance between the contention that arsenic-resistant strains are characterized by feeble infectivity and transmissibility (see Hoar this Bulletin 1947 v. 44 1049) and the field observation that when a strain becomes resistant it also seems to cause a flare-up of the endemo-epidemic situation. However the rising incidence of arsenic-resistant cases seems now to have been stemmed by the increasing use of mass prophylaxis.

In the 12 years up to December 31st 1947 the Fordians has treated, in the Kwango Sector 57,177 sleeping sickness cases of whom 87 per cent. were cured, 21 per cent. are still under treatment and 1 per cent. have disappeared, and only 5.4 per cent. have died. Detailed statistics are given for each sub-sector.

E. M. Lowe

WILCOCKS R. G. Determination of Proteins in Cerebro-Spinal Fluid. [Correspondence.] *Nature* 1949 Feb 29 329-30

In view of the need felt by many medical men concerned with sleeping sickness for improved methods of estimating the protein content of cerebrospinal fluid the author working in the Government Chemical Laboratory in Accra has elaborated a method depending on the xanthoproteic reaction. This obviates some of the objections inherent in existing methods which depend on the estimation of opalescence or volume of precipitate.

The detail cannot be usefully presented in the form of an abstract and the original, very concise paper should be consulted by those interested. (The method seems rather too complicated to be likely to find its way with field officers who have no spare time or facilities for refined chemical procedures.)

F. M. Lowe

GUIN M. Glycémie et glycogène dans la pleurésie d'état de la trypanosomiose humaine. Glucose Content of the Blood and Cerebrospinal Fluid in Sleeping Sickness. *Bull. Méd. de l'Afrique Occidentale Française* 1949 v. 5 N. 1 93-7

Glucose estimations were made on the blood and cerebrospinal fluid in 71 poorly nourished patients in both stages of sleeping sickness. Specimens were taken 12 hours after the last meal. Control observations were made on 49 uninfected subjects. No significant difference was found between the infected and the uninfected groups in respect either of the blood or of the cerebrospinal fluid.

E. M. Lowe

TOWN R. W. WILLS E. D. & WOXALL A. Action of Suramin on Enzymes. *Nature* 1949 May 7 705-6 11 ref.

The carbohydrate and oxidative metabolism of trypanosomes occurs at relatively very high rate. One theory of the mode of chemotherapeutic action of suramin (antryptol Mayer 216) is that it combines with or otherwise inhibits enzymes in the trypanosome which are necessary for this vigorous metabolism. The authors are therefore studying the action of suramin on various enzymes.

systems, including those of the trypanosome. So far their attention has been confined mainly to the yeast enzymes concerned with carbohydrate metabolism and some other enzymes selected for special reasons.

It had previously been found that suramin is toxic to fumarase but not to urease [this *Bulletin*, 1932, v 29, 295]. The authors confirm that urease is not affected at pH 7.5, but they find that marked inhibition occurs at pH 5. This is perhaps related to the presence of a urea structure in suramin, and it may depend on competitive inhibition though it may alternatively be due to the compound's sulphonic acid groups. The inhibition is evidently of a specific nature, since it is not exercised against enzymes in general when tested at pH 5 as might have been expected in view of the fact that suramin combines with a variety of proteins at that hydrogen ion concentration.

Trypsin has also been found to be much more sensitive to suramin than was previously reported. This may be due to the similarity between the urea linkage of suramin and the peptide linkage of proteins.

The fermentation of glucose by yeast juice is inhibited by suramin in concentrations considerably below those that might be present in the blood after dosages such as are used in clinical practice.

E M Lourie

SCHLEYER, W. L. & SCHNITZER, R. J. **The Inhibition of the Anti-Trypanosomal Activity of Arsenoso Compounds and Acridines by Esters and Amides of Organic Acids** *J Immunology* 1948, Oct, v 60, No 2, 265-76 [18 refs.]

This interesting paper describes a new category of interference effect against the anti-trypanosomal activity of arsenicals and acridines. Some of the categories of interference with arsenicals already well established are those due to the following —

- (i) Parafuchsin [BROWNING and GULBRANSEN, this *Bulletin*, 1922, v 19, 882]
- (ii) Thiol compounds [VOEGTLIN, DYER and LEONARD, this *Bulletin*, 1924, v 21, 414], development of which led to the discovery of BAL as an antidote for arsenical poisoning by the team led by PETERS during the recent war.
- (iii) *p*-aminobenzoic acid in relation to *p*-arsenosphenylbutyric acid [WILLIAMSON and LOURIE, this *Bulletin*, 1947, v 44, 48]
- (iv) Melamine, in relation to melaminyl arsenicals [WILLIAMSON and LOURIE, this *Bulletin*, 1948, v 45, 413]

The new interference phenomenon has been demonstrated both *in vitro* and *in vivo*. The two arsenicals mainly studied were both phenylarsenoxides, namely mapharsen and N-(*p*-arsenosobenzyl)-glycineamide hydrochloride, the acridine was acriflavine. The interference was exhibited by simple esters and amides of substituted benzoic acids (e.g. methyl-*p*-hydroxybenzoate and *p*-hydroxybenzamide), and by corresponding nicotinic acid derivatives. The acids themselves, tested as sodium salts, were inactive. When the newly discovered antagonists were used together with thiol substances, an additive or synergistic inhibitory effect was observed. A similar synergistic inhibition was noted, in respect of acridine but not of arsenical activity, when the new compounds were used in conjunction with yeast nucleic acid, which is known to be an inhibitor for the antibacterial effects of acridines.

Arsenic acids and arsenobenzenes were not antagonized by the new substances, nor were trivalent or pentavalent antimonials.

A table shows various points of difference between the features of inhibition exercised by some of the known types of interfering agent. For example, the new compounds do not affect toxicity of the arsenicals for the host, as do thiol compounds, again, inhibition by the new compounds is demonstrable both *in vitro* and *in vivo*, while inhibition by parafuchsin is said to be demonstrable only *in vivo*. The authors accordingly infer that essentially

different mechanisms of inhibitory effect are involved. They have shown that methyl *p*-hydroxybenzoate not only inhibits the antagonistic effect of aromatic compounds on isolated enzyme systems of *Bacter coli* but may even exert a stimulant effect on some of these enzymes. This suggests a possible basis for the mechanism of inhibitory effect of the substances concerned.

T. M. Lowie

SCHOTAPPEL E. B. & GREENSPAN E. M. The Pharmacology Mode of Action and Therapeutic Potentialities of Stilbamidine Pentamidine Propamidine and other Aromatic Diamidines—a Review *Medicine* 1945, Sept., v 27 No. 3 37-77 [193 refs.]

This is a detailed and comprehensive survey of the development and present status of the diamidines as therapeutic agents. They are of course best known as remedies for protozoal infections, and their use in this connexion has been adequately reviewed in this *Bulletin* as the work has proceeded. Those who are not familiar with the progress of research on the diamidines in fields other than that of tropical medicine may be interested to know that there have been several surprising and significant developments in these other fields. Propamidine might have become very widely used as a wound disinfectant if not for the discovery of sulphonamides and penicillin. More striking is the fact that diamidines have some degree of tumour-inhibiting activity. There is evidence that they combine with and inactivate specific nucleic acids or nucleoproteins thus preventing the growth of certain tumour cells as studied in laboratory animals and in tissue cultures. This property apparently also underlies the fact that stilbamidine has a remarkably ameliorative though not a curative effect on multiple myelomatosis in man. Of more direct interest to tropical workers is the finding that propamidine exercises an inhibitory effect against a limited range of fungi *in vitro* *Bulletin of Hygiene* 1943 v 20 760. The treatment of fungus diseases by diamidines might accordingly be worth investigating.

[The authors state that the early work of LOURIE and LOWIE (this *Bulletin* 1940, v 37-404) established the aromatic diamidines as potentially active agents against infections with African trypanosomes such as *T. brucei* and *T. gambiense*. It might here be mentioned, though, that all the published work up to the present on field trials is distinct from trials in laboratory animals with the aromatic diamidines against the trypanosomes of man have been carried out against *T. gambiense* infections. It is a curious gap in the study of these compounds that no report has yet appeared on their action against naturally occurring *T. brucei* infections.]

E. M. Lowie

FULTON J. D. & GOODWIN T. W. Hydrolytic Changes in Solutions of Stilbamidine *J. Pharm. & Pharmacol.* London 1947, 1 v 1 No. 1 11-16
Abstract on p. 13 of

Working in the Sudan, HENRY (this *Bulletin* 1944, 41 1186) found that among the changes undergone by stilbamidine solution in diffuse daylight there is hydrolysis of the amidine groups to the corresponding mono- and di-amides. In fact he isolated and identified 4-carbamyl-4-aminodiphenylamine from such solutions. HENRY J. *Chem. Soc.* (1945 870) 1 (England 1947) (this *Bulletin* 1948 v 45 508) found that the only product formed by exposure of stilbamidine solutions to light was 1,3,4-tri-4-aminodiphenyl) endobutane.

In 1947, Drs Henry and Kirk sent the authors some bottles of stilbamidine hydrochloride solution prepared in the Sudan and kept since 1941 and 1942 in the dark or in diffuse sunlight. The solutions contained two types of crystalline deposit, one of which the authors have confirmed as 4-carbamyl-4'-amidino-stilbene and the other they have identified as 4,4'-dicarbamyl-stilbene.

Since deposits had never been observed in stilbamidine solutions kept for more than a year at room temperature in England, the authors prepared further solutions which they then subjected to various conditions of light and temperature over a period of 6 months. Under certain conditions deposits appeared consisting of mono- and diamides identical with the products formed in the Sudan. Temperature is apparently important, for the monoamide (though only traces of diamide) were obtained by keeping solutions at 37°C for 6 to 17 weeks, while no amides were formed at laboratory temperatures. Occasional exposure to electric light also increased the yield considerably, as compared with solutions kept in complete darkness. Good yields of both amides were readily obtained by autoclaving for several hours at 1 to 2 atmospheres pressure.

Tests showed the monoamide to be more toxic than stilbamidine and inactive against *T. rhodesiense* and *T. congolense* infections in mice. Similar tests with the diamide were not possible because of its relative insolubility. Studies of fluorescence on ultra-violet illumination showed that stilbamidine is selectively concentrated at the blepharoplast and at a point near the anterior end of both *T. rhodesiense* and *T. congolense*, while the monoamide is diffusely distributed throughout the bodies of these trypanosomes.

Autoclaving solutions of stilbamidine for only 20 minutes at 5 lb pressure, the method used by OASTLER and FIDLER [this *Bulletin*, 1946, v 43, 1029] did not produce any demonstrable chemical change and did not increase the toxicity of the solutions for mice. It is therefore suggested that the lesions described by these workers in dogs treated with such solutions were due to unchanged stilbamidine.

E M Lourie

NODENOT, L. Note sur une infection accidentelle avec une souche de *Trypanosoma gambiense* [An Accidental *T. gambiense* Infection] *Bull. Soc. Path. Exot.* 1949, v 42, Nos 1/2, 16-18.

The infection was accidentally contracted in the laboratory in Paris and is evidently the one mentioned by LAUNOY [this *Bulletin*, 1949, v 46, 337]. There was an incubation period of 10 days, followed by regular intermittent bi-quotidian fever, with severe headache and general symptoms. Parasites were numerous in the blood, and the spleen was enlarged. Lymph glands were not palpable and the cerebrospinal fluid was normal. Lomidine was given intramuscularly, 0.2 gm (i.e., 3.25 mgm per kgm) daily for 5 days. Trypanosomes disappeared the day after the first dose, and the original symptoms and signs rapidly cleared up. However, the patient began to complain of pain in the buttock, where a tender induration could be felt.

There was a rest-period of 8 days, and another 5-day course of lomidine treatment was then started. After the first injection the patient complained of a bitter taste in the mouth, a feeling of constriction in the throat, recrudescence of the pain in the buttock, difficulty in walking, and weakness. The symptoms became worse during treatment, which was accordingly stopped after the third injection. It took 6 weeks to recover from these symptoms, which the author ascribes to saturation of the body with the drug, and which were reminiscent of those described by SICÉ in another accidental laboratory infection treated with pentamidine [see this *Bulletin*, 1948, v 45, 876].

E M Lourie

BRAUDINENT R. BROCHEY L. & PEZZIAT J. Not sur l'action curative du diméthino-diphénoxy-pentane administré par voie orale dans la trypanosomiase humaine africaine. [Treatment of Sleeping Sickness by Lomidine administered Orally.] *Bull Soc Path. E et.* 1949 v 4. Nos. 1/2. 18-22.

Twenty-one cases of *T. gambiense* sleeping sickness, early and late were treated orally by lomidine (dimethanesulphonat of pentamidine base). The drug was given either in a single dose or fractionated every day for 5 days. The daily dose for most patients was 20 to 30 mgm. per kgm. A total for the 5 days of 120 mgm. per kgm. was perfectly tolerated by some but others who received 73 and 114 mgm. per kgm. suff. red from diarrhoea and vomiting.

In 60 per cent. of cases the trypanosomes had disappeared from the blood and cerebrospinal fluid within 24 hours of a first dose of 20 to 30 mgm. per kgm. and in all cases early and late they had disappeared by the end of treatment courses varying from 114 to 150 mgm. per kgm. for the period of 5 days.

Of 9 first-stage patients there were 2 relapses within a fortnight. The other 7 have been under observation for periods of 1 to 5 months. No information is yet available on the fate of the second-stage cases.

The authors admit that the oral route appears to give therapeutic results inferior to those obtained by injection but they are undeterred from exploring the potentialities of oral administration for prophylaxis. Only an experiment conducted on a vast scale will permit the fixing of optimal prophylactic dosages. We propose to carry out such an experiment. E. M. Lewis

GASQ M. Action de la Lomidine (251^{er} R.P.) sur la glycémie des trypanosomés en 1^{er} et 2^{ème} périodes. (Premiers résultats.) Action of Lomidine on the Blood Sugar in Sleeping Sickness. *Bull. Méd. de l'Afrique Occidentale Française* 1949 v 5 No. 1. 99-103. 1 folding chart.

Blood sugar estimations were made on 8 patients undergoing treatment by lomidine (dimethanesulphonat of pentamidine base) for the early & late stage of sleeping sickness. Treatment was by 3 mgm. per kgm. nit a monocularly every alternate day for 5 injections. The blood was examined not less than 1 hour since the last meal specimens being taken immediately before an injection and then at intervals of 10 minutes for one hour.

Results were similar in the two stages of infection. There was an increase from an average of about 83 mgm. per 100 cc. to a peak 1108 mgm. in 20 minutes. There was then a drop to about 80 mgm. at 30 minutes, followed by a gradual rise to the original level at the end of the observation period of one hour. E. M. Lewis

FRIEDHEIM, E. A. II. VOGLZ, H. J. & BERNAN Rose L. Un composé organique stibé curatif et prophylactique dans la trypanosomiase expérimentale. An Organic Antimony Compound with Curative and Prophylactic Activity in Experimental Trypanosomiasis. *Bull. Méd. de l'Afrique Occidentale Française* 1949 v 5 No. 1. 85-8.

This is substantially a French translation of an earlier paper by FRIEDHEIM and BERNAN this *Bulletin* 1946, v 43. 11-4 with a few omissions and with additional data showing that the prophylactic action of the compound in question (M.b) is superior to that of uramin (morany) for *T. equiperdum* infections of mice. One-sixth of the maximum tolerated dose of M.b intraperitoneally protected all of five mice inoculated 68 days later but a comparable dose of uramin protected only 1 five mice tested on the 61st day. E. M. Lewis

LE ROUZIC, J & LAPEYSSONNIE, L Les médicaments nouveaux dans la trypanosomiase [The New Drugs for Sleeping Sickness.] *Bull Méd de l'Afrique Occidentale Française* 1948, v 5, No 1, 7-22

The author reviews French West African experience with FRIEDHEIM's melamnyl compounds, the diamidines, and EAGLE's "70A"

Melarsen —[See FRIEDHEIM, this *Bulletin*, 1941, v 38, 634, NODENOT, this *Bulletin*, 1949, v 46, 238] Of 22 late cases treated at Bobo with samples received since 1946, the cerebrospinal fluid was restored to normal in 8 and improved in 6 Unlike tryparsamide, which either renders the cerebrospinal fluid normal "immediately" or leaves it unchanged, melarsen brings it back to normal by slow stages over a period of some months There were no instances of damage to the optic nerve Melarsen is said to have the further advantage that it acts on trypanosomes both in the lymphatico-blood system and in the central nervous system, French workers hold that tryparsamide acts only in the latter situation

Melarsen oxide and *Mel B* (or *Melarsen B A L*) —[See FRIEDHEIM, this *Bulletin*, 1949, v 46, 711] These compounds are said to have the same advantages as melarsen, with the additional advantage that they can be given in a much shorter course of treatment The author appears to place greater faith in Mel B than in Melarsen oxide Success is claimed in 50 per cent of an unspecified number of second stage cases

MSb V —[See FRIEDHEIM and BERMAN, this *Bulletin*, 1946, v 43, 1124, and FRIEDHEIM, VOGEL and BERMAN, above] All the field observations on this compound till now have been made by Dr Friedheim himself For treatment, as distinct from prophylaxis, it has been given either alone or in combined courses with the following —

MSb III and *MSb B*, trivalent variants of *MSb V* —These three compounds are active against early cases, but they have an inconstant and superficial action on second stage cases

Diamidines —The aromatic diamidines have been curative in 90 per cent of early cases, but are undependable when there is even a slight alteration in the cerebrospinal fluid A directive was accordingly issued for all first stage cases in French West Africa and in Togo to be treated by pentamidine (5 injections of 3 mgm per kgm) which is regarded as rather more effective than propamidine Pentamidine will, however, gradually be replaced by "lomidine", the dimethanesulphonate of pentamidine base Among 1,011 first stage cases treated by pentamidine there have so far been 93.7 per cent cures, without any toxic complications There were only 2 cases (0.02 per cent) of chemo-resistance, and even these were not fully substantiated

70A or *p*-arsenosophenylbutyric acid —[See EAGLE, this *Bulletin*, 1946, v 43, 1017] Although this compound is ineffective in second stage cases when given alone, the results have been "brilliant", with 75 per cent successes, when it was given in combination with tryparsamide The compound is, therefore, said to be "not without interest" [CECCALDI *et al*, this *Bulletin*, 1948, v 45, 771 found combined treatment with 70A and tryparsamide to give results inferior to those obtained with established forms of treatment]

E M Lourie

WILSON, S G Drug-Resistance shown by Trypanosomes following "Antrycide" Treatment [Correspondence] *Nature* 1949, June 4, 873-4

At Entebbe the soluble salt of "Antrycide", in doses of 3-5 mgm per kilo, cured *T. simiae* infections in pigs One pig relapsed after 2 mgm per kilo of the relatively insoluble chloride, a second treatment with 5 mgm per kilo of the

soluble salt the sulphate [presumably methylsulphate] then failed to cure and the relapse strain was therefore considered to have become resistant.

Ten cattle were dosed with 2 gm. each of "Antrycide" sulphate and were then exposed to infection in a *G. pallidipes* area. Only one was still alive six months later and a strain of *T. congolense* passed from this animal into a calf treated with 5 mgm. per kilo of the sulphate. Two of six mice infected with this strain relapsed after treatment with 10 mgm. per kilo of the sulphate. A field strain collected in the same area from an untreated ox was cured by 0.5 mgm. per kilo.

Some animals re-infected several months after treatment with antrycide and re-treated with curative doses have developed cryptic but nevertheless fatal infections.

There is some evidence that *T. vivax* likewise quickly develops resistance to antrycide and there is evidence also that *T. congolense* which develops resistance to antrycide as a result of treatment with this compound becomes resistant at the same time to dimidium bromide.

Doses in excess of 10 mgm. per kilo [no doubt of the soluble salt] may be rapidly toxic: the animal dyes, 7 to 8 hours after treatment; in other cases gastro-enteritis develops 2 days after treatment and death occurs between the sixth and twelfth days.

E. M. Lounie

BARTISCH MED. J. 1949 June 11 1046-7 Control of Trypanosomiasis, Insecticides and Antrycide.

A general article based on an address by Dr D. G. Davey on the use of antrycide against trypanosomiasis in animals, particularly cattle in Africa. Although antrycide is a very promising drug and has been shown to give protection to cattle for at least 4-6 months, the possibility of naturally or artificially induced resistant strains of trypanosomes being encountered had to be born in mind. Only further trials and observations would show what contribution to the development of Africa could be expected from antrycide.

[See this Bulletin 1949 v. 46 338.]

D. S. Hertram

LAUXOV L. & JEANPI. F. C. Nouvelle dix-mont de la prophylaxie chimique d'infection à *T. qu. perdom* d rat blanc par ingestion d diamidion-diphénocypentane. "New Observations on the Chemoprophylaxis of Trypanosome qu. perdom Infection in the White Rat by Ingestion of Diamidion-diphénocypentane." C. R. Soc. Biol. 1949 Mar. 143 Nos 5 & 6 328.

RUBIN, B. A. An In-vitro Assay for Trypanocidal Activity. J. Biol. & Med. 1948 Mar. 20 v. 4 81-83.

The classical method of YOFFE, ANAN and MISCHEVICH (this B. 1939 v. 27 237) for keeping pathogenic trypanosomes in culture for 24 hours depends on suspending these organisms in a concentration not above 1,000 per cmm in a medium composed of inactivated sheep or rabbit serum diluted with Ringer solution containing 0.2 per cent glucose. It is the method that the author takes his own technique which he describes in much detail, for the assay of compounds is as simple as is reported in the literature. The medium is composed of serum which is inactivated at 44°C for 1 hour and is diluted with twice its volume of Ringer solution. The medium is then centrifuged and the supernatant is used for all analyses. The final pH is 8.3 to 8.5. It is used at 1 mgm. per ml. then mixed with an equal volume of filtered Ringer solution with 0.5 mgm. per ml. of formalin so that there could be 40 to 150 trypanosomes and 10 to 20 times that

number of red blood cells, per cmm Drug solutions are added in amounts of 0.1 cc in distilled water to 0.4 cc of infected medium After 18 to 20 hours at 37°C the specimens are examined for trypanosomes and haemolysis

The Ringer glucose solution recommended by YORKE contained 0.9 per cent sodium chloride The author finds it better to use 0.75 per cent, and the final concentration of sodium chloride is even less after the solutions of drug in distilled water have been added

Some batches of medium completely failed to support trypanosomes, and thus the author attributes to the possibility that one of the donors from whom the pooled serum was obtained might recently have received an injection of an arsenical

E M Lourie

RUBIN, B A The Trypanocidal Effect of Antibiotic Lactones and of their Analogs *Yale J Biol & Med* 1948, Jan, v 20, No 3, 233-72 [38 refs]

The method described by the author [above], was used in order to investigate the trypanocidal potentialities of antibiotic lactones and their analogues Such substances are widely distributed in nature, particularly in lichens, moulds, and higher plants They occur in various natural dyes, in vitamin E, in the haemorrhagic principle of clover, in fish poisons, in insecticides, in numerous alkaloids, and in the digitalis glycosides Furan analogues of lactones occur in large amounts in corn-cobs, oat-hulls, and other plant substances, and one of these compounds, "Furacin" has already been shown to have some action on trypanosome infections [DODD, this *Bulletin*, 1948, v 45, 52] Pyrroles, nitrogen analogues of the furanes, are also widely distributed in nature, being best known in porphyrin pigments and in various animal and plant dyes

Altogether 44 compounds were tested "Furacin" was the most promising Delta lactones were more active than gamma lactone analogues, the three lactones with highest *in vivo* activity being 2-pentene-1,4-diol, penicillic, and coumalinic acids There was no correlation between *in vivo* and *in vitro* effects Thus clavacin was one of the most highly trypanocidal substances *in vitro*, but it was too toxic for any *in vivo* property to come into effect This substance has no surface tension reducing power at room temperature, and yet it is trypanocidal in a dilution of 1 in 1,000,000 at that temperature, a finding which the author says is at variance with theories which require some surface effect to occur before a drug can exercise its biological action In other instances there was high surface activity with neither trypanocidal nor haemolytic effect

Beside "Furacin" two other furanes showed some action *in vivo*, furfural and furfuryl alcohol Hydrogenated furanes were inactive

All nitrogen analogues tested were toxic and inactive *in vivo*

Most of the compounds were also tested against *Shigella dysenteriae* and *Staphylococcus aureus*, but no quantitative relationship was found between antibacterial and trypanocidal activities

E M Lourie

VILAIN, P De la répartition géographique des glossines en A O F [The Geographical Distribution of Tsetse Flies in French West Africa] *Bull Méd de l'Afrique Occidentale Française* 1948, v 5, No 1, 107-16

Since the days of Roubaud and Bouet, some forty years ago, little that is new has been recorded about *Glossina* in French West Africa The author has carried out field work in the Upper Volta He has also received very many specimens collected by the medical staff in many districts Of a total of 120,000 specimens over 95 per cent were *G. palpalis*, *tachinoides* or *morsitans* Six other species were represented in small numbers

The paper reports geographical distribution, but in a rather general manner and without adding much precision to what is already known. We feel that in assessing the commonness of an insect the author relies too much on the number of specimens sent in. Some species may well be overlooked unless special methods of collecting are employed. P. A. B. v. m.

LOAND. PROTECT RATE. Annual Report of the Tsetse Control Department for the Year ended 31st December 1947 (SLAUGHTER, D. I. Acting Director of Tsetse Control) 18 pp 1948. Entebbe Govt. Printer [Shs. 1/30]

LE ROZIC. La prophylaxie agronomique. Un moyen de lutte pour l'assainissement des régions infestées. [Tsetse Control by Agricultural Methods.] Bull. Météo de l'Afrique Occidentale Française 1948, v 5 No. 1 117-22.

An autonomous sleeping sickness service was initiated in French West Africa in 1909. The present paper gives a general account of its work.

In most respects the methods in use are those which are generally familiar. We notice that the French put much emphasis on *prophylaxie agronomique* which is equivalent to the cultivation of the area which has been cleared, and its occupation by human beings. In making a waterside clearing close to an infected village they recommend a clearing 50 metres wide and 700 long, against *G. palpalis*; rather smaller clearings are said to be sufficient against *G. f. morsitans*. British experience would lead one to expect that such clearings are not sufficiently long to give complete protection from either of these insects. The French view is, we think, that this rather short clearing combined with diagnosis and treatment of human cases gives satisfactory results at least in savannah country. In forest where no doubt clearing would be very expensive both in primary cost and annual maintenance the author says that drugs alone do not overcome sleeping sickness: the number of new cases in successive years appears to demonstrate this.

The author attaches much importance to the sacred groves which often occur on the edge of a village. The local people cannot in any way interfere with these places, which form breeding places of *Glossina* in close contact with man. These places have been very numerous in the Upper Volta and their destruction is a most important measure in the reduction of fly and the control of sleeping sickness. We note that the French make much use of the labour of individuals in good health who are under treatment or have been recently treated for trypanosome infections. They can on occasion also obtain voluntary labour from villages.

The paper contains statistics for a number of years, showing the area cleared and planted, and the number of new cases of trypanosomiasis for different regions of French West Africa. P. A. B. v. m.

WHITESIDE, E. F. An Experiment in Control of Tsetse with DDT-treated Oxen. Bull. Entom. Res. 1949 May, v 40 Pt 1 123-34 ? figs. 17 refs.]

The object of this experiment was to determine the feasibility of exterminating tsetse flies by introducing a large number of cattle treated with DDT into their habitat. An area of thorn bush about 5 square miles in Tanganyika was chosen for the test. There was evidence that this territory was relatively isolated from external sources of tsetse flies owing to 1½ miles of clearing all round. The cattle were grazed in herds of 10 (Phase I) or 5 (Phase II) at the rate of 68 to the square mile. They were thus about 6 times as numerous as large game but less common than small game.

The DDT treatment was by a solution of 9 per cent DDT and 9 per cent resin in groundnut oil, applied all over the body (except the head) to give about 10 gm DDT per animal (450 mgm per sq ft). This treatment was applied weekly at first and later twice a week. Two months of this regular treatment did not harm the cattle.

The tsetse fly populations were assessed by 48 random catches per week (Two boys with a black cloth moving at random for two hours constitutes a "catch"). The results of the experiment were estimated by two arithmetical methods described in detail, one depends on changes in numbers on the test area, the other depends on relation to fly catches in an external control. A mean of the two estimates was considered most reliable.

According to the observed reductions, the mean kill of flies was about 70 per cent during Phase I and 95 per cent in Phase II. At the rate of progress observed, it was calculated that extermination of tsetse flies would take 22 months with herds of 10 cattle and about 9 months with herds of 5. Further splitting of the cattle would require too many herdsmen.

The slow progress of the reduction is due to tsetse flies feeding on animals other than the treated cattle. It would not be possible greatly to increase numbers of cattle because they were near the limit which can be supported on this type of country.

J R Buxvine

See also p 984, LOURENÇO MARQUES, MOÇAMBIQUE. *Missão de combate as tripanossomíases. Relatório anual de 1947*

FAUST, E C. The Etiologic Agent of Chagas' Disease in the United States. *Bol Oficina Sanitaria Panamericana* 1949, May, v 28, No 5, 455-61 [24 refs]

This paper reviews the information available on the occurrence of triatomid bugs and mammals naturally infected with *Trypanosoma cruzi* in the United States of America. A list is also given of the bugs and mammals successfully infected experimentally. The data are conveniently set out in tables showing the names of the insects and the mammals, their geographical origin, and the references to the original papers from which the information has been extracted.

There is apparently no substantial published evidence that Chagas's disease occurs in man in the United States despite the considerable evidence of its occurrence as a disease of lower mammals. Seven mammals and seven species and two subspecies of triatomid bug have been found naturally infected.

It is concluded that the apparent absence of human infections in the presence of this animal reservoir cannot yet be adequately explained. Steps should, it is suggested, be taken meanwhile to control the bugs in infested premises and to carry on further investigations on the habits of the bugs.

D S Bertram

PIFANO, F. Nouvelle trypanosomiase humaine de la région néotropicale produite par le *Trypanosoma rangeli*. Tejera, 1920. [A New Form of Human Trypanosomiasis of Neotropical Regions, produced by *Trypanosoma rangeli*. Tejera 1920.] *Bull Soc Path Exot* 1948, v 41, Nos 11/12, 671-80, 3 figs

This paper is, in large part, a recapitulation of work already published by Pifano and his colleagues on the occasion of the first successful direct cultivation of *Trypanosoma rangeli* from the peripheral blood [this *Bulletin*, 1948, v 45, 1072]. Previous findings of *T rangeli* in reduviid bugs or in human patients are discussed and the fact is noted that the authors have now

demonstrated that natural infections with *T. rangeli* are found in dogs as well as in man. In one dog the parasite was encountered in direct examination of the peripheral blood. Work on the parasite is in progress. A detailed description is given of the morphology of the parasite in the peripheral blood, in reduced bugs and in cultures. It is considered that *T. rangeli* is now established as a parasite of man and the dog and that in consequence there must be considered to be two forms of trypanosomiasis in the New World, due to *T. cruzi* and *T. rangeli*.

H. E. Shaw

FLOCH H. & ABOUY C. L. Sur l'identification de *Trypanosoma concolor* (DODDAN 1809) sa présence en Guyane française [The Identification of *Trypanosoma concolor* (DODDAN 1809) and its Presence in French Guiana.] *Bull. Soc. Path. Exot.* 1949 v. 42, No. 3 A, 221-9. 4 figs. [18 refs.]

LEISHMANIASIS

BRACKARAN J. A Report of Two Cases of Kala Azar with Delirium as a Prominent Feature. *Indian Med. Gaz.* 1949 Apr. v. 84 No. 4 139-40.

TRINCO G. Síndrome anémico d'kala-azar [Anemic Syndrome in Kala Azar] 68 pp. [N. meroni refs.] 1948. Lisbon.

This is a reprint of chapters III to VI of the author's fuller monograph (this *Bulletin* 1949 v. 48, 127).

I. SARROUY C., AUBAUD-BATTANDIER R. & CANALIS R. Deux nouvelles observations de kala-azar infantile traitées par le "168 R.P." [Deux techniques d'administration du "168 R.P." Two more cases of infantile Kala Azar treated by 168 R.P. The Technique of Treatment.] *Péd. Méd.* 1947 Apr. No. 4 233-9. 1 fig. & 4 charts.

II. D'ESMOUGES J. R. & MESSERSCHMITT J. Kala-azar de l'adulte guéri par une seule cure de "168 R.P." [Kala Azar in an Adult cured by a Single Course of 168 R.P.] *Ibid.* 1948, Mar. No. 3 15-9. 4 figs.

III. MÉDECINE TROP. MARSEILLES 1948, July-Aug-Sept-Oct. No. 4 490-91. A propos du 168 R.P. et de son dosage dans les urines. [Concerning 168 R.P. and its Estimation in the Urine.]

I. For previous reports on the use of "168 R.P." against kala-azar see SARROUY *et al.*, (this *Bulletin* 1947 v. 44 55 and 207) and DIXON *et al.* *Ibid.* 1948.

The present report concerns two infants both very severely affected. The first patient was 13 months old, weighed 18.8 kgm. and had been ill for 5 months.

Anthelmintic given on alternate days for 3 doses was ineffective. But a 10-day course of 168 R.P. 90 mgm. per kgm. daily intramuscularly produced an immediate and striking improvement maintained for the next two periods of 3 months. The second case was an adult of 44 years weighing 17 kgm. in wretched condition suffering not only from kala-azar but also from pulmonary and peritoneal tuberculosis and an intercurrent catarrhal pancreatitis. The drug was given in smaller doses and for a longer time than in the first case. There was some improvement but parities could still be seen at the end of treatment. It developed measles with an intense laryngitis and died.

The authors conclude by stating that a non-toxic antimonial like 168 R.P. should be given in massive doses and in a short course of treatment.

11 Most patients treated so far by 2168 R P have been children, but an adult case is here reported in considerable detail. The patient was 20 years old, weighing 58 kgm, and had been seriously ill for 8 months. He was treated by 100 mgm per kgm daily (except for the first two doses which were rather less), to a total of 76.5 gm for the whole course. Results were excellent, over an observation period of two months, and the authors believe the patient to be cured. They write that all important references to previous use of this compound are given by R. SOHIER in the *Journal de Médecine de Lyon* for September 5th, 1947.

111 A brief paper, over the initials G. F., declares that 2168 R P is rapidly and completely eliminated in the urine. Methods of urine estimation are described.
E. M. Lourie

HAZARIKA, A. N. Treatment of Kala-Azar with Pentamidine Isothionate. A Study of 55 Cases. *Indian Med Gaz* 1949, Apr., v 84, No 4, 140-45

A series of 55 Indian patients were treated for kala azar, with pentamidine isethionate [incorrectly referred to throughout as isothionate]. In each case the diagnosis was confirmed by the finding of leishmania by spleen puncture. Of the 55 patients 34 were antimony-resistant. The drug was given daily in a 10 per cent solution, intravenously in 25 cases, intramuscularly in 28, and by both methods in the remaining two cases. The maximum daily dose was based on the weight of the patient, in 19 cases this was 1.0 mgm per pound weight of patient and in 32 it was 1.5 mgm, in the other 4 it was just outside this range. To obviate toxic reactions, the initial doses were usually less than this maximum. Ten to twenty injections were given to each patient and the total relative dose (per 100 lb weight of patient) ranged between 0.60 and 3.00 grammes.

The immediate reactions to intravenous injections were the vasomotor symptoms usually associated with the 4'-diamidine drugs but they were not severe, except in one case and there were no late sequelae such as the neuropathies associated with stilbamidine. There were no immediate reactions after intramuscular injections. However, 4 patients developed oedema during or after treatment.

Three patients died and one absconded. The rest were clinically cured at the time of discharge—immediate cure rate 94.44 per cent. In a follow-up investigation, it was found that 6 months after the completion of the course 16 of the 42 followed up had relapsed, a relapse rate of 38.09 per cent.

The relapse rate among antimony-resistant cases was 33.33 and among the remainder 50.00 per cent. There was little difference in the relapse rate between those receiving 1.0 mgm and those receiving 1.5 mgm of the drug per pound weight, the figures were 46.6 per cent and 34.78 per cent, respectively.

It is suggested that in view of the absence of toxic symptoms larger dosages might be employed.
L. E. Napier

ADA, G. & FULTON, J. D. Electrophoretic Studies on the Serum of Golden Hamsters infected with *Leishmania donovani*. *Brit J Exper Pathol* 1948, Dec., v 29, No 6, 524-9

During the first six weeks of *Leishmania donovani* infection in the golden hamster the serum pattern remains unchanged. There is then a marked decrease in the amount of albumin accompanied by an increase of α -globulin, the concentration of total protein remaining normal. There is a concurrent

Children in all the schools within a radius of five miles were inspected, but no case of gross infestation with lice was detected.

No further cases of typhus have occurred up to the time of writing, six months after the occurrence.

John W. D. Meigs

RIS H & FOX, J. P. The Cytology of Rickettsiae. *J. Exper. Med.* 1943 June 1 v. 89 No. 6 681-5 1 text fig. & 17 figs. on 7 pls. (14 r. 16.)

The authors describe a series of studies in which highly specialized technical methods were employed, including the use of the phase-contrast and the electron microscope. Twelve excellent photographs, most of which were taken with these microscopes, show that *Rickettsia prowazekii* has a physical structure of the same type as most bacteria: their "nuclear structures" or "chromatinic bodies" are sharply defined minute spheres which are single in spherical forms of rickettsiae and vary in number from two to four in rod-shaped rickettsiae; occasional dumb-bell forms occur; these are probably undergoing nuclear division.

By special cytochemical and staining methods the authors have found evidence to show that the nuclear structures like those of bacteria, contain desoxyribonucleic acid as well as ribonucleic acid, whereas some previous workers have concluded that rickettsiae resemble viruses in containing only one type of nucleic acid.

John W. D. Meigs

ZAHARIA, N. I. & DIMITRIU, A. Les réticulocytes au cours du typhus exanthématique. (The Reticulocytes in Typhus Fever.) *Arch. Roumaines Path. Expt. et Microbiol.* 1943, v. 15 No. 1/2, 101-11 graphs.

The author gives a summary of modern views on the significance of changes observed in the number and type of reticulocytes during the progress of certain diseases.

In 25 typhus patients an irregularly progressive diminution occurred in the number of the reticulocytes after the 3rd or 4th day; in some cases there was a total disappearance of the reticulocytes during the second week. There was a return to the normal number during convalescence. The diminution was most pronounced in the old reticulocytes so that the formula showed deviation to the left, followed in the 3rd and 4th weeks by a slight deviation to the right.

The reticulocytopenia was regarded as being due to damage caused to the bone marrow by the typhus toxin.

John W. D. Meigs

COMBESCO, D., DIMITRISCO, N. & CORJESCO-MANCIULESCU, E. Mme. Recherches sur le typhus exanthématique. L'influence de la splénectomie sur la réceptivité des animaux de laboratoire à l'infection expérimentale-typhique. (The Influence of Splenectomy on the Susceptibility of Animals to Experimental Typhus Infection.) *Arch. Roumaines Path. Expt. et Microbiol.* 1943 v. 15 No. 1/2, 91-103 13 charts.

The spleens of five guinea-pigs were removed at periods ranging from 30 to 138 days after experimental attacks of typhus fever. Four to ten days after the operation the animals were challenged by a second inoculation with typhus infection. Four reacted in the same way as normal control guinea-pigs and one was immune.

In similar experiments on five rabbits it was found that two had lost their immunity after splenectomy and three did not react to the challenge of reinoculation.

John W. D. Meigs

COMBIESCO, D, DUMITRESCO, N, STURDZA, Nina & BOTEZ, V, Mme, with the collaboration of C POPESCO, G PANAITESCO & C ZILISTEANU Recherches sur le typhus exanthématique Étude sur l'immunité acquise Efficacité comparative de trois vaccins tués Propriétés sérologiques des sujets vaccinés [A Serological Study of the Immunity caused by three Killed Typhus Vaccines] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2, 68-90, 4 graphs & 1 fig [23 refs]

Tests were carried out at fixed intervals on the sera of three groups of 24-25 men vaccinated with a yolk-sac, a mouse-lung, and a dog-lung typhus vaccine respectively The number of *Rickettsia prowazekii* in each type of vaccine was approximately the same

No significant difference in the antigenic activity of the three vaccines was observed

In the combined results of Weil-Felix tests the percentages of positive reactions at titres of 1-100 to 1-250 were —before vaccination, 27, thirty days after vaccination, 67.2, sixty days after vaccination, 40.0, and ninety days after vaccination, 2.3 In 20 per cent of the cases the reaction remained negative at 1-50 throughout the period

With the Kudicke and Steuer dry-blood rapid agglutination test [see this *Bulletin*, 1943, v 40, 898] negative reactions were always obtained, though this test was always positive in cases of typhus in which the Weil-Felix titre was higher than 1-250

The intradermal rabbit test of Giroud was carried out on sera of 46 of the men, in six cases there was some degree of "neutralizing power" before vaccination, in 33 a considerable degree of neutralizing power was acquired after vaccination, and in two the reaction was moderately positive before and after vaccination No significant difference was observed in the responses observed after vaccination with the three different vaccines There was no correlation between the results of the Giroud and the Weil-Felix tests, often one was positive and the other negative When both were positive the times of appearance of the reactions were different and the Weil-Felix reaction remained positive longer than the Giroud which always became negative before the 60th day The authors regard these results as being additional evidence that the protective antibodies are independent of the anti-proteus agglutinins

[The rapid disappearance of the antibodies concerned in the Giroud reaction suggests that they are not the substances responsible for giving durable protection against typhus fever]

John W D Megaw

DENT, J E, MORLAN, H B & HILL, E L Effects of DDT Dusting on Domestic Rats under Colony and Field Conditions *Pub Health Rep* Wash 1949, May 27, v 64, No 21, 666-71, 1 chart

A colony of rats was exposed to conditions similar to those occurring when DDT dust is used for the control of rat fleas By the end of three weeks 24 of the rats had died The liver and fat of the dead rats contained enough DDT to account for death Within 11 weeks, 36.3 per cent of the rats died, apparently of DDT poisoning, but it is stated that general field observations indicate that this rate is in excess of what can be expected under conditions in which the rats have greater opportunities of avoiding contact with the dust

No mention is made of the occurrence of births in the colony which consisted originally of 43 male, 50 female, and 20 baby rats The only comment on the effect of the procedure on the rat population is the statement that DDT dusting "affected this directly"

John W D Megaw

DERICK, E. H. & BROWN H. E. Isolation of the Karp Strain of *Rickettsia tsutsugamushi*. *Lancet*. 1949 July 23 150-51 [17 refs.]

The Karp strain of *Rickettsia tsutsugamushi* (*R. orientalis*) well deserves a biographical note. It was isolated by the authors at Brisbane in January 1943 by inoculating a guinea-pig with the blood of an American soldier called Karp who had been infected in New Guinea before being evacuated to Australia. The guinea-pig had a sharp febrile attack which started 10 days after inoculation and the strain was readily passed through other guinea-pigs, none of which died during the first nine passages but thereafter about 50 per cent. of the inoculated guinea-pigs succumbed.

In its pathogenicity to the originally inoculated guinea-pig the strain differed from Malayan and other strains. It has been very extensively used in the experimental study of scrub typhus, for example in 1945 by such workers as TORRIS FULTON and JOYNER and BERTSON and since that time by many other workers.

It has been responsible for a considerable number of laboratory infections already noted in this *Bulletin* including the tragic fatal illness of Miss Dora LUSH at the Melbourne Laboratory in 1943.

John W. D. Meyer

SMITH C. N. COLE M. M. & GORCK H. H. Biology and Control of the American Dog Tick. *U.S. Dept. Agric. Tech. Bull. No. 803* Wash. 1949, 74 pp. 37 figs. [21 refs.]

DE MAGALHÃES O. Profilaxia do tifo exantemático neotrópico no Brasil. [Prevention of Neotropical Exanthematic Typhus in Brazil.] *Rev. Hig. e Saú. P&M* 1949, Apr.-Dec. v. 8 Nos. 2, 3 & 4 169-78.

The author describes the measures needed for the control of tick borne typhus in Brazil. He refers to the bed-bug as being a transmitting vector in addition to the ticks *Amblyomma cajennense* and *A. latense*. The method of control recommended are—destruction of the vector arthropods and of animals known to be reservoirs of infection especially dogs and goats, propaganda by cinema, posters, leaflets and lectures and vaccination by yolk-sac vaccines.

It is suggested that in addition to the very severe cases which special attention has been paid there are also mild and even inapparent attack during "silent" periods and in areas in which the disease is not detected. The mild attacks may be caused by transmission by bed-bugs or by strains of rickettsiae of low virulence transmitted by ticks. It is believed that in certain areas the population has been immunized by these mild attacks so it is doubtful whether yearly vaccination would be of sufficient value to justify the maintenance of an expensive organization.

John W. D. Meyer

COMBESCU D. V. MILU V. & DIMITRIU N. Identificarea unei noi forme de Rickettsiacee chez Homoem en Romania. Identification of a New Human Rickettsial Disease Q fever of Romania. *J. A. Roumaine Path. L. M.* et *Microb.* 1948 15 Nos. 1 & 2, 229-32.

See this *Bulletin* 1949 v. 49, 627

COMBESCU D. & DIMITRIU N. Sur la nature des rickettsies isolées de la maladie dénommée rickettsiose humaine en Roumanie. [Survival of *R. akishii* Isolated in Romania. *Arch. Roumaine Path. L. M.* et *Microb.* 1948 15 Nos. 1 & 2, 241-3.]

See this *Bulletin* 1949 48, 627

COMBIESCO, D, DUMITRESCO, N, STURDZA, Nina, BOTEZ, V, Mme, CIUREA, V & ZARNEA, G Recherches expérimentales sur la nouvelle rickettsiose isolée en Roumanie [Investigations into the New Rickettsial Disease [Q Fever] of Rumania] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2, 242-4

The author describes briefly the reactions produced in guineapigs inoculated with the strain of *Rickettsia burneti* isolated from Q fever patients in Rumania.

The rickettsia survived in guineapigs up to 64 days. None of the 50 guineapigs employed in the course of 14 transfers died. The chief lesions found in guineapigs sacrificed on the 4th day of the fever were great enlargement of the spleen and extensive congestion with mononuclear-cell infiltration of the interalveolar tissues of the lungs.

John W D Megaw

COMBIESCO, D, COMBIESCO, Cornelia, DUMITRESCO, N, POPESCO, C & ZARNEA, G Diagnostic rétrospectif par la réaction de fixation du complément, d'un nouveau foyer de la maladie provoquée par la nouvelle rickettsiose identifiée en Roumanie [Retrospective Diagnosis of a New Focus of Q fever in Rumania] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2, 264-5

See this *Bulletin*, 1949, v. 46, 627.

COMBIESCO, D, DUMITRESCO, N, BOTEZ, V, Mme, STURDZA, Nina & ZARNEA, G Infections de laboratoire avec la nouvelle rickettsiose isolée en Roumanie [Laboratory Infection with the New Rickettsial Disease [Q Fever] of Rumania.] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2, 244-7

Three of the workers engaged in the manipulation of material infected with *Rickettsia burneti* suffered from attacks of Q fever. The diagnosis was confirmed by complement-fixation tests in which an Australian and a local antigen were used.

Infection was believed to have been acquired by the inhalation of infected droplets.

John W D Megaw

WOLFE, D M & KORNFIELD, Lottie The Application of a Quantitative Complement-Fixation Method to a Study of Q Fever Strain Differentiation *J Immunology* 1949, Apr, v 61, No 4, 297-306 [18 refs]

Several workers have observed disconcerting differences in the complement-fixing antigens of various strains of Q fever rickettsiae [see this *Bulletin*, 1949, v 46, 726].

The authors found that when fixation tests were carried out in the usual way, by the "serum dilution" or "antigen dilution" method, the reactions with the American (Dyer) strain of antigen were at much lower titres than those obtained with the Italian (Henzerling) or the Australian strain.

A series of tests was made with the quantitative complement-fixation technique developed by the Division of Laboratories and Research of the New York State Department of Health. The technique is much too complicated for general use, the underlying principle is that all reactions are evaluated in terms of the amount of complement needed for 50 per cent haemolysis [see this *Bulletin*, 1946, v 43, 210, and 1947, v 44, 654].

Twenty sera of persons infected in America, Italy, Germany, and Switzerland were tested and the titres observed were not significantly different in any serum irrespective of whether the antigen used was of American or Italian origin.

John W D Megaw

CALVERT J. F. A Preliminary Report of a Search for Q Fever in New Zealand
New Zealand Med J 1949 Apr., v 48 No 264 174-9. (16 refs.)

No evidence of Q fever infection was found in any of four patients treated at the Auckland hospital for primary atypical pneumonia. Blood from three of the patients taken at the height of the fever was inoculated intraperitoneally into guinea-pigs with negative results, and the sera of the patients, examined 23 to 47 days after the attack gave negative reactions to agglutination tests against *Rickettsia burnetii*.

Agglutination tests carried out on 11 abattoir workers and 17 dairy farmers in places where *H. emphyzal. hispaniae* was common, also gave negative results.
 John H. D. Meyer

BOWER A. G. Q Fever. *Arizona M J* 1949 May v 6, No. 5 30-33. (31 refs.)

The clinical features of Q fever in California are briefly described. Pulmonary lesions occur in 80 per cent. of the cases and in these differentiation from primary atypical pneumonia is impossible on purely clinical grounds though early and frequent chills are in favour of Q fever.

The severity ranges from mild ambulatory attacks in which the patient feels ill for one or two days, to a prolonged severe illness needing hospital treatment for a month or more. The average duration is 7 to 11 days.

Streptomycin was effective in daily quantities of 2 to 3 gm. given intramuscularly in six divided doses during the febrile period, and in half these doses for the next two to four days.

Aureomycin is said to be specific. It is given by the mouth in total daily doses 150 mgm. per kgm. body weight but it is very costly at present.

Infection is believed to be acquired chiefly by inhaling infected dust from material contaminated by the urine or dung of cattle but drinking infected milk is also a mode of transmission.
 John H. D. Meyer

YELLOW FEVER

MAHAFFY A. F. The Epidemiology of Yellow Fever in Central Africa. *Trans Roy Soc Trop Med & Hyg* 1949 May v 42, No. 6 511-1. maps, 77 refs. Discussion 525-30. LINDLAY G. M. M. (in reply) J. F. MARGRAITH B. CARNHAM P. C. C. HACKETT C. J. RAY W. MORGAN M. T. MAHAFFY A. F. (in reply)

In 1936 a team of workers under Mahaffy commenced study of the epidemiology of yellow fever in Central Africa. In the course of the following 14 years this group has made many contributions to our knowledge of the subject and in addition has found at least eight new viruses.

Practically all the studies of Mahaffy and his colleagues were made in Bwamba County, Uganda which is a small heavily forested area. The main forest (Nemba) is known to be human habitation but about 35,000 people live in the cultivated zone between it and large areas of unraided Mijikenda country and man were all examined for virus and most of the results have been described in detail already in numerous papers which have been fully reported in this Bulletin.

The main point made by Mahaffy was that yellow fever never appeared to be primarily due to *S. f. f. f.* (the *A. f. f.*) in the forest. All attempts to isolate virus from these mosquitoes in the area

of their investigation were unsuccessful. Arboreal monkeys, however, raid the human plantations for food and may be bitten by *A. simpsoni* which then transmits the disease to man. *A. simpsoni* may on occasion also enter the forest for a blood meal and bite an infected monkey. Although *A. aegypti* occurs in this region it apparently plays no part in the cycle. The naturally infected monkeys seldom die and they travel only very short distances.

In discussion of Dr Mahaffy's paper it was mentioned that there was a lot of evidence which suggested that the forest type of the disease exists in West Africa and that monkeys play as important a part as vertebrate hosts but the forest vector has not yet been found in that region. Mahaffy said he regarded it as extremely unlikely that the control of either the animal host or the forest vector could be undertaken with any reasonable hope of success. Persons exposed to the sylvan type of the disease can, however, be protected against it by vaccination.

F O MacCallum

HOVANITZ, W. Comparisons of Mating Behavior, Growth Rate, and Factors Influencing Egg-hatching in South American *Haemagogus* Mosquitoes. *Physiol Zool* Chicago 1946, v 19 No 1 35-53, 5 figs [18 refs]

RABIES

JERVIS, G. A. & KOPROWSKI, H. Encephalomyelitis of possible Allergic Etiology in Mice Injected with Rabies Vaccine. *Canadian J Comp Med* 1949, May, v 13, No 5, 116-21, 3 figs [21 refs]

Occasionally paralysis of limbs has been observed in mice after vaccination with the Semple type of rabies vaccine. Thus, in the experiment described in the present article, 55 Swiss mice were employed in testing, by Habel's method, the potency of a phenolized, wholly inactivated, rabies vaccine, prepared from horse-brain tissue infected with rabbit-brain fixed virus, 2 animals developed a paralysis which, beginning in the posterior limbs, gradually extended to the anterior limbs.

In the paralysed mice, sacrificed one month after the appearance of first symptoms, the pathological lesions occurred almost exclusively in the white matter of the central nervous system as multiple, small areas of demyelination and perivascular infiltrations distributed throughout the spinal cord, cerebellum and midbrain, they were unlike those caused by mouse encephalomyelitis virus (typically inflammatory reactions localized in the grey matter, absence of demyelinating areas), but closely resembled those obtained in guinea-pigs after injection of rabbit brain with adjuvants. Inasmuch as the mice in the present study received inoculations of brain tissue without adjuvants however, the conditions of the experiment approximated to those in human subjects receiving repeated injections of rabies vaccine, even if the total dosage per kilogramme of body weight in mice was 25 times that in man.

In their summary the authors suggest that the lesions found in the paralysed mice may have been due to an allergic reaction to an antigen in the horse-brain tissue present in the rabies vaccine. The similarity of this pathological picture to that previously described in the guinea-pig under similar experimental conditions is stressed and its bearing on post-vaccinal encephalitis in human subjects receiving anti-rabies treatment is indicated.

G Stuart

PLAGUE

SEAL, S. C. Pneumonic Plague Cases in Calcutta and Gaya. *Indian Med Gaz* 1949 Apr v 84 No. 4 162-70 1 fig & 2 charts. [15 refs.]

Between March 25th and April 7th, 1949 twelve members of a family community of 31 persons were attacked with pneumonic plague and two other persons who had come into close contact with the patients were also attacked. Only one of the patients survived—he was treated with streptomycin in a Calcutta hospital.

Infection was introduced by a member of the family who had arrived from a plague infected locality on the day of onset of his illness. Four days later two attacks occurred and during the following three days there were seven more cases. After an interval of three days the remaining four patients were attacked within a period of three days. No further cases occurred although large numbers of persons came into close contact with several of the patients attacked during the latter stage of the outbreak—some of these patients had fled from the infected household during the incubation period and others were admitted to hospitals where the nature of their illness was not at first recognized.

The incubation period was usually about two days—death occurred in most of the cases within two or three days—in two cases the patients died after an illness of five days. Signs of lung involvement were not striking there was little sputum and this was blood-stained in only one case.

A brief reference is made to another outbreak at Gaya, Bihar in which a homoeopathic doctor became infected while attending a group of six patients who had become infected in a distant locality where plague was occurring. Ten members of the doctor's family of 18 persons were attacked and died in rapid succession.

These outbreaks were typical of plague pneumonia as it occurs in India. The author quotes the records of nine outbreaks which occurred in Eastern Bengal between 1898 and 1911—the number of cases ranged from 4 to 51 and all but one was in a locality where plague had not occurred. The 1st in Plague Commission of 1908 is quoted as stating that only about 30 per cent of the cases of plague in India were of the pneumonic type.

[The rapid and spontaneous termination of these dramatic outbreaks suggests that when infection is transmitted from man to man by droplet infection the organisms soon lose their virulence. Another interesting feature of plague pneumonia is that although many outbreaks have occurred in plague free areas there is no record of the establishment of infection among the rats of the affected localities. In India at any rate the outbreak though tragic appears to be self-limited and to be of little epidemiological importance.]

John H. D. Menzies

POLLITZER, R. Recent Trends in the Treatment and Control of Plague. *Acta Tropica*. Basle 1949 6 No. 1 30-40. 23 refs.

This is a valuable critical summary of recent advances in connexion with the treatment and control of plague. In treatment the sulphonamides have proved their value—sulphadiazine and sulpham-razine are specially recommended because they can be given intravenously in severe cases.

Streptomycin given alone or as a supplement to sulphonamide treatment has given still better results. Serum can be expected to add to the efficacy of the treatment especially if the new purified rabbit serum can be made available. The above lines of treatment may save the lives of some pneumonic plague patients.

Great importance is attached to the use of sulphonamides as prophylactics for persons who have come in contact with patients suffering from pneumonic plague, but the method is not recommended for general use in bubonic plague. Killed vaccines are of undoubted value, especially when the two-dose method is adopted and booster doses are given later when risk of infection persists. Living attenuated vaccines may become suitable for general use if they can be made available in stable, lyophilized, form, so also may purified crystalline antigens.

Flea control by DDT, and inoculation, are the methods of control most generally applicable in the presence of infection. The elimination of rats is the ideal method of long-term control.

Treatment of patients in their own homes or in village emergency hospitals should be far more widely carried out than is the case at present.

John W D Megaw

RUEGSEGGER, J M & GILCHRIST, H. The Present Outlook in Plague. *Indian Med Gaz* 1949, Apr, v 84, No 4, 159-61 [22 refs]

This article is on the same lines as the above, but the authors have not had the advantage of personal experience in the field.

A prediction is made that when more potent and less expensive antibiotics become available plague vaccines will lose their popularity.

[In reaching this opinion the authors have probably been influenced by certain recent reports which are regarded by most experts as having conveyed an unduly pessimistic impression of the efficacy of vaccines.]

John W D Megaw

CHOLERA

- 1 BROUNST, G & MAROUN, T. Recherche d'anticorps chez des sujets vaccinés contre le choléra [Agglutinin Levels after Inoculation against Cholera] *Ann Inst Pasteur* 1949, June, v 76, No 6, 554-7
- 11 GALLUT, J & BROUNST, G. Sur la mise en évidence des agglutinines cholériques [Demonstration of Agglutinins in Cholera] *Ibid*, 557-9

1 The agglutinin levels produced by inoculation with anti-cholera vaccine were determined in 486 military subjects. A first series of sera was taken from 371 subjects 20 to 60 days after inoculation with a single dose of a vaccine containing equal parts of Inaba- and Ogawa-type strains at a total dosage of 2,000 million vibrios. The tests were made against suspensions of *V. cholerae* in 0.2 per cent formal-saline. Of the 371 sera, 365 were negative at a dilution of 1 in 25. 6 (1.6 per cent) were positive at dilutions of 1 in 25 to 1 in 100 only.

A second series of tests was made on sera of 95 subjects who, in addition to the initial dose of 2,000 million vibrios, received two additional doses of the vaccine bringing the total to 14,000 million. At the same period after inoculation, 84 sera gave negative results and 11 (11.5 per cent) were positive at dilutions of 1 in 25 to 1 in 100.

In view of the mediocre results obtained in the above tests live suspensions of *V. cholerae* were used for tests of a third series of 20 sera of persons given the same course of inoculation as the second series. Of these 13 were negative and 7 (35 per cent) were positive at 1 in 25 to 1 in 200.

Local reaction to intradermal injection of 0.1 cc. of anti-cholera vaccine was tested in 10 immunized subjects. 5 showed redness and swelling of some degree with or without a zone of necrosis or palpable nodule at the site of the injection.

The results are considered to show that the production of agglutinins in persons inoculated with anti-cholera vaccine is exceptional and less frequent than is generally supposed. The use of formalinized suspensions for the test will reduce the number of positives obtained. The test for intradermal reactivity may be useful for demonstrating evidence of immunity.

i. Following on the work reported above a comparison was made in more detail of the results of agglutination tests with living and formalinized suspensions of *V. cholerae*. The living suspensions were used fresh and the formalinized after being kept for 24 hours and for 7 days. The sera of 18 persons inoculated with the same total of 14,000 million vibrios were examined. Against live Inaba suspensions 8 were negative, 8 positive (1 in 20, 1 positive at 1 in 50, 2 positive at 1 in 100 and 1 positive at 1 in 500). Against live Ogawa suspensions 4 were negative, 8 positive at 1 in 50, 7 positive at 1 in 20 and 1 positive at 1 in 500. With formalinized suspensions kept 24 hours before use only 3 gave positive results with the Inaba strain and with the Ogawa strain, the titres being 1 in 20 to 1 in 50. When the suspensions were kept 7 days before use two only gave positive results with Inaba and one with Ogawa suspension, at the same low levels.

Additional tests were carried out with anti-O cholera diagnostic sera prepared in rabbits and showing titres of 1 in 10,000 with the homologous type strain, when living suspensions were employed. Titres with formalinized suspensions were only about one-quarter of those obtained with living suspensions.

The authors conclude that it is essential to use live suspensions for agglutination tests on the sera of inoculated persons, for the purpose of demonstrating the presence of antibodies, on account of the very low titre usually reached.

[This is the usual method employed by experienced cholera workers.]

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ADAMS A. R. D. & SEATON D. R. Amoebiasis in England as a Household Disease. *Brit Med J* 1949 July 16 131.

Isolated cases of a toxithonous amoebic infection have been recorded in Britain, but for the most part without regard to the source of infection or of infectivity to contacts. The authors now report three families in Liverpool in each of which more than one member was suffering from amoebiasis. The original cases were seen in July 1947, July 1948 and February 1949 respectively.

The first case was that of a ship officer who had had proved amoebic dysentery for a few weeks. His wife, who had not been overseas, had recently developed diarrhoea and examination of her stools showed that she had active amoebic dysentery.

The second case was in a boy (16 yr) who had undetermined dysentery intermittently for 1 year. Numerous very faint *E. histolytica* were found in the stools. He had been all his life in Liverpool slum. In all the other members of his family. The boy's mother had had diarrhoea for two months and stool examination showed that she had acute amoebic dysentery. The

stepfather and four of the six other children were passing *E histolytica* cysts, but were in good health. The family was also largely infected with *E coli*, *Giardia* and threadworms.

The last case was that of a boy of 7 with an intractable colitis for three years. Very large numbers of vegetative *E histolytica* were found in the stools. He had never lived out of Liverpool. Stools from five other members of the family were negative, except those of his stepfather who was passing *E histolytica* cysts. He had no history of dysentery but had been in India until he was 13 (he is now 45) and had lived in England ever since.

The authors point out that these experiences are a reminder that amoebiasis may easily spread in households where personal cleanliness is not high. They stress the necessity of excluding amoebic dysentery by microscopic examination before ulcerative colitis is diagnosed. The possibility of the former condition being present is not perhaps considered sufficiently in Britain, yet two of the patients referred to above had been ill for years and were in poor health for want of proper diagnosis which earlier microscopic examination would have readily provided.

H J O'D Burke-Gaffney

GAEHLINGER, H. La dysenterie ambiennne, maladie d'association parasitaire et microbienne [Amoebic Dysentery as a Combined Parasitic and Bacterial Disease] *Bruxelles-Méd* 1949, June 5, v 29, No 23, 1255-60.

Some authors attribute the pathogenicity of *Entamoeba histolytica* solely to the parasite, others consider it dependent on an association with certain bacterial concomitants. The author, on the evidence, considers it certain that amoebic dysenteric manifestations are aggravated by concurrent bacterial infections. Reviewing the history of the treatment of amoebic dysentery he refers to the failure of emetine to sterilize the infection, and he considers that drugs like the iodoquinolines, rivanol, benzo-metacresol and the pentavalent arsenicals, all of which exert some amoebicidal action, have an antiseptic action. Emetine itself is not only an amoebicide but it promotes the agglutination and phagocytosis of pyogenic micro-organisms. These facts support the view that concomitant bacterial infections play their rôle in determining the pathogenicity of an amoebic infestation, and the remarkable success of the emetine-penicillin-sulphaguanidine treatment of severe amoebiasis confirms this. There is no evidence, the author suggests, that non-pathogenic strains of *E histolytica* exist, or of the existence of *E dispar* as a separate species. The apparently non-pathogenic strains of amoebae rapidly become pathogenic in a suitable bacterial environment. The conditions for this are prevalent in the human bowel in hot moist countries, and less so in cold temperate climates.

A R D Adams

PIPKIN, A C. Experimental Studies on the Role of Filth Flies in the Transmission of *Entamoeba histolytica*. *Amer J Hyg* 1949, May, v 49, No 3, 255-75 [26 refs.]

The author re-examines the role of flies as disseminators of *Entamoeba histolytica*, the causative organism of amoebic dysentery. Instructive results are obtained by a comparison of the ability of *Musca domestica*, *Lucilia pallens*, *Cochliomyia macellaria*, *Phormia regina* and *Sarcophaga musera* var *sarracenoides* to carry cysts and vegetative forms on the external parts of the body, in the crop, midgut and hindgut, or to deposit them in the vomit or in the faecal drops. At various intervals after clean, laboratory-bred flies of each species had fed on a highly infected faecal pabulum, direct observations were made

on washings or on dissections of the flies and a parallel series of cultures were set up from the same material. Vomit drops and faecal drops were taken up in micropipettes and examined by similar means.

Culturable trophozoites did not persist on the external surfaces of flies for more than 15 minutes after contact with infected material. Trophozoites were, however, culturable after 40 minutes in the crop and 30 minutes in the midgut but none were cultured from the rectum although they were seen by direct observation in this region 10 minutes after the meal.

Cysts survived longer than the trophozoites. On the external parts of the body they persisted in culturable form for up to 4 minutes and for as long as 210 minutes in the crop, 740 minutes in the midgut and 10 minutes in the rectum.

In the vomit drop, trophozoites were obtained in culturable form for up to 17 minutes and culturable cysts for 64 minutes after the infecting meal. Faecal drops contained culturable cysts for as long as 234 minutes.

Detailed figures are provided in elaborate tables and a comprehensive statistical analysis of the data shows that there is, in fact, a tendency for both trophozoites and cysts to survive longer in the crop than in the midgut or rectum of all the species of fly. This amoebicidal effect apparent only in the midgut and rectal region of the flies was not more marked in one species than in another. Cysts survived the passage through the gut better than did the trophozoites.

The number of flies vomiting infective drops was substantially the same for each species. On the other hand, the total number of infective vomit drops varied significantly with the species: the larger species continued to vomit culturable cysts for longer periods than the smaller species. This is attributed to the larger capacity of the crop of the larger flies. There was however, less evidence to suggest that the length of the gut affected the length of time during which infective faeces could be deposited.

It is concluded that the passage by flies of viable cysts in their vomit drops and in their faeces are the two most likely methods by which they could play a part in the spread of amoebic dysentery. External carriage of any form of the amoeba and the deposition of trophozoites in the vomit or in the faeces are considered to be mechanisms of minor importance.

D. S. Hertram

ORTIZAR E. R. & MONTERO O. L. *Amoebiasis crónica y apendicitis*. [Chronic Amoebiasis and Appendicitis.] *Rev. Med. Chile* 1949 76 77 N. 105-106, 5 figs. 27 refs.]

The authors point out how often the appendix may be invaded by *E. histolytica* and quote the figures given by Laut 1936 in which the appendix came a close second to the caecum—the 41st most in 1st, 3rd and 33.3 per cent, respectively. They relate details of few known examples where the diagnosis was by no means easy and the symptoms were those of appendicitis, acute or chronic, and in one the operation of appendectomy was undertaken. Diagnosis may need the help of a detailed study of the history, rectoscopy, faecal examination, complement fixation and radiological examination after administration of a barium enema.

H. Harold Scott

SMITH B. Two Cases of Amoebic Liver Abscess with Complications. *Ind. Med. Gaz.* 1949 Apr. 84 No. 4 147-B.

"The post-mortem findings of two cases of amoebic liver abscess with complications are described. Case 1 had no history of amoebic dysentery. The

abscess in the liver was situated on the posterior aspect of the left lobe. Pin-point amoebic ulcers were found in the upper part of the descending colon only. The liver showed a typical amoebic abscess but amoebae could not be demonstrated in histological sections. The abscess in the lung as well as the pin-point ulcers in the descending colon showed amoebae in large numbers. Case 2 was admitted to hospital with amoebic dysentery. At autopsy no dysenteric ulceration of the gut was to be seen. He had an encysted liver abscess as well as an encysted abscess of the spleen, abscess of the lung and a cerebral abscess showing secondary infection. No amoebae could be demonstrated in any of the abscesses."

DAVIS, F W, Jr. *Amoebiasis. Experience in the Johns Hopkins Hospital, 1936-1946. Amer J Med Sci* 1949, May, v 217, No 5, 505-17 [50 refs]

Between 1936 and 1946, 296 in-patients at the Johns Hopkins Hospital were said to suffer from amoebiasis, of these only 205 were diagnosed parasitologically, and these accounted for 0.51 per cent of all admissions to the medical wards during this period. The author has analysed the data relevant to these cases in the light of the considerable literature on the subject. The protean nature of the symptomatology and physical findings in amoebiasis is re-emphasized, diarrhoea and abdominal tenderness proved the most constant features. The iodoquinoline compounds are advocated in the treatment of uncomplicated amoebiasis, emetine being reserved for severe cases and those with extra-intestinal involvement. In resistant cases combinations of drugs may be used, but the preparations employed are of less consequence than their administration for an adequate period. Twenty-five per cent of the patients continued to suffer from symptoms after treatment, although the stools no longer contained parasites, a true post-amoebic ulcerative colitis developed in only 5.9 per cent of the cases.

[This paper covers a wide field and gives a restrained and well-balanced account of the subject, it should be consulted in the original by those interested.]
A R D Adams

MALHOTRA, S L. *Causes of Failure in Treatment of Amoebic Dysentery. Indian Med Gaz* 1949, Mar, v 84, No 3, 96-8

In spite of improved methods resulting from war experience, the apparent cure-rate after treatment of amoebiasis in India, where the infection is very prevalent, is still unsatisfactory. Possible reasons for this are examined and the author suggests that in re-infection from the faecally contaminated fingers of the patient or from those of carriers in the household, and not in persistence of the infection, lies the real explanation.
A R D Adams

BROUGHTON, N, OGILVIE, A C F & WYLIE, W D. *Diagnosis and Treatment in Latent Amoebiasis with special reference to Cases presenting with Pyrexia alone. J Trop Med & Hyg* 1949, June, v 52, No 6, 112-20

The authors observed 676 cases of amoebiasis in Aden between February and November 1947, most of these were free from symptoms. The diagnosis was based on recovery of the parasite by stool examination before or "after a provocative dose of emetine with or without purgation", sigmoidoscopy was a routine unless refused by the patient, but infection was detected solely by this means in only three cases. The clinical and pathological findings are discussed in some detail as the authors were impressed by their mildness or

absence in so many cases an aspect of amoebiasis to which they believe inadequate attention is directed in the textbooks. They consider stool re-examination is desirable for all persons returning from the highly endemic areas to the United Kingdom as carriers ("symptomless cases") all have lesions in the gut they need treatment both for the sake of themselves and to prevent dissemination of the infection to others. The treatment given by the authors followed conventional lines.

A. R. D. Adams

BATTERSBY, A. R. & OPENSHAW, H. T. Studies on the Structure of Emetine. Part I. The Hofmann Degradation. *J. Chem. Soc.* 1949 Suppl. Issue No. 1 59-67

BATTERSBY, A. R. & OPENSHAW, H. T. Studies on the Structure of Emetine. Part II. Oxidation with Mercuric Acetate, and the Properties of Eubrometolium Salts. *J. Chem. Soc.* 1949 Suppl. Issue No. 1 67-71

BATTERSBY, A. R. & OPENSHAW, H. T. Studies on the Structure of Emetine. Part III. Stability of some *o*-Arylalkyl-trimethylammonium Iodides. *J. Chem. Soc.* 1949 May 1174-9

DO PRADO, F. C. Tratamento da amebíase. (Treatment of Amoebiasis.) *Hospital, Rio de Janeiro*. 1947 Mar., v. 31 No. 3, 431-40. English summary

After preliminary remarks on the various drugs employed in the treatment of infection by *E. histolytica*—emetine hydrochloride, enterovioform, yatrien carbamate, enterovioranol, etc., and adjuvant drugs such as sulphaguanidine, bacteriophages, vaccines and care in diet—the author refers to 140 selected cases of his own which he treated with iodine preparations (iodoquinoline) and pentavalent arsenicals in alternate weeks for a total of four months. He followed them up for a year or more and groups the results as follows: 98 were cured, amoebae were no longer found and the clinical symptoms cleared up; 24 still had attacks of diarrhoea or intestinal disturbance although the amoebae could no longer be found. The remaining 18 presented signs of a more or less chronic colitis with relapses or exacerbations, such as general depression, easy fatigue, transitory pain in the liver region, intolerance of certain foods, although faecal examination failed to reveal any entamoebae.

H. Harnd Scott

KNOTT, ALVA A. & MILLER, JEANNE. Comparative Studies on the Iodine Absorption of Anayodin, Chiniolon, Diiodoquin, and Vioform in Man. *Ann. Intern. Med.* 1949 June, v. 32, No. 6 1180-87 1 fig. 11 refs.

All these substances are iso-hydroxyquinolines. Anayodin—the same as chiniolon (also known as quinoxal) and yatrien! Distinguished from chiniolon by absence of the sulphonic acid group, diiodoquin has two iodine substituents, while vioform has one iodine and one chlorine.

Since direct methods of assay of these drugs are not available, their absorption after oral treatment was studied indirectly by determining blood iodine levels. The studies involving a total of 280 estimations were made on 76 patients under ambulatory treatment for amoebiasis, the treatment being the usual therapeutic dosage administered daily. In 10 cases peak blood concentration was reached before the 24th day of treatment and there was no evidence of cumulative absorption or toxicity. The recommended

therapeutic dosage of diodoquin gives the highest iodine blood levels, anayodin and chiniofon the lowest, while vioform gives intermediate values. However if absorbability be measured by relating the blood levels to iodine intake, then vioform ranks highest, diodoquin second, and anayodin and chiniofon third.

Evidently none of these compounds is wholly non-absorbable, as has previously been stated in connexion with diodoquin, and the fact that "reasonable" iodine blood levels are attained raises a question as to the effectiveness of these drugs on amoebae deep in the walls of the intestine or in other parts of the body. "If therapeutic value is dependent on iodine absorption, Diodoquin, Vioform and Anayodin or Chiniofon would rank in the order given in therapeutic effectiveness."

E M Lourie

GAN, K. H. Bijdrage tot de kennis van de amoeben bij ratten. [Contribution to the Knowledge of the Amoebae in Rats] *Med. Maandblad Batavia* 1919, Mar 1, v 2, No 3, 70-76 [12 refs.] English summary

The author describes two kinds of amoebae found in laboratory rats and in wild *Rattus rattus diardi*, in Batavia. One of these amoebae is said to resemble *Entamoeba histolytica*, while the other is *E. muris*. Both occur in the caecum of the rats.

In *E. muris* the ectoplasm is not clearly demarcated from the endoplasm and the movements are sluggish. Its general appearance is like that of *E. coli*, but, according to the author, it can be distinguished from the latter (1) by the smaller size of its cysts, and (2) by the structure of its nucleus, in which the peripheral chromatin granules are arranged in the form of a complete ring instead of an interrupted ring. The author saw only binucleate cysts with a large glycogen vacuole in *E. muris*.

The *histolytica*-like *entamoeba* is active, its pseudopodia are protruded rapidly and the ectoplasm is clearly separated from the endoplasm. The nucleus is conspicuous in unstained amoebae, and in stained preparations the peripheral chromatin granules appear in the form of an interrupted ring, which is said to be a characteristic of *E. histolytica* while the karyosome [the author's "chromatin mass"] may be central or eccentric. Only binucleate cysts were seen, in which there was a large vacuole displacing the nuclei to the periphery.

The food vacuoles in both amoebae contained bacteria. On addition of rat blood to samples of faeces containing the amoebae, the *histolytica*-like form readily ingested erythrocytes, whereas *E. muris* was less inclined to do so. Attempts to infect kittens with both kinds of the rat amoebae were unsuccessful. The paper is illustrated by photomicrographs and schematic figures illustrating the two types of *entamoeba* seen in rats.

The characters adduced for the *histolytica*-like amoeba, especially its nuclear structure and cysts, are not peculiar to *E. histolytica*, the presence of which in the author's material is therefore somewhat doubtful. It is more probable that both the amoebae described in this paper represent *E. muris*.

C. A. Hoare

COUTIN, I., COCHET, G. & BICLET, J. Fréquence du parasitisme à *Giardia intestinalis* chez les enfants âgés de deux à six ans de la région du Nord. Frequency of *Giardia intestinalis* Infection in Children of Two to Six Years in the North of France. *Bull. Soc. Path. Exot.* 1949, v 12, Nos 3/4, 103-6.

Sixty-nine stool examinations, 5403 in all, were made in specimens from 1915 apparently healthy children in kindergarten schools in the Nord region.

Among these 629 (37.84 per cent.) harboured *Giardia intestinalis*; this incidence is one of the highest recorded among children in temperate regions.

H J O'D Burke-Gaffney

SIRKER, M. U. Two Atypical Cases of *Giardia* Infection. *Indian Med Gaz.* 1949 Mar., v 84 No. 3 103.

The first of these patients was a Muslim adult who had continuous pain around the umbilicus for three years. He had some anæmia and his general health had deteriorated. Treatment for chronic dysentery was ineffective. No parasites were found in the blood or stools other than *Giardia* cysts which were present on three consecutive daily examinations. Mepacrine in three courses at an interval of two weeks [dosage not stated] resulted in uninterrupted improvement.

The second patient was a child of seven with bronchial asthma, without eosinophilia. His liver was enlarged one inch below the costal margin. The general health was not affected. Treatment for asthma was ineffective. As the patient used to have one or two loose stools before the paroxysms of asthma the stools were examined. *Giardia* cysts were numerous; there were no other parasites found in the stools or in the blood. A similar course of mepacrine was given: no attacks of asthma have occurred for several months and the enlargement of the liver has diminished.

H J O'D Burke-Gaffney

RITA G. & LEVI DELLA VIDA, B. Coccidio umana da *Isofovea* (nel di cui caso osservato a Roma.) [A Case of Human Coccidiosis in Rome] *Riv. d. Pat. Assit.* Rome 1949 June v 10 No. 2 117-119 figs. English summary (3 lines)

Infection of man by *Isofovea belli* is not common: the case reported here is only the fourth so far noted in Italy, previous ones being by SANGIORGIO in 1918 (this *Bulletin* 1919 17-22) and by FRANCHINI in 1927 *ibid.* 1928, v 25 733) and 1932. Infection is usually accompanied by some other parasitic protozoal or helminthic, and in the present instance by *Entamoeba histolytica* and *E. coli*.

The patient was an Englishman of 70 years resident for three years in Rome. He suffered from gastro-intestinal disturbance with diarrhoea, and faecal examination revealed cysts and vegetative forms of *E. histolytica* and *E. coli* and numerous oocysts of coccidia. Treatment with emetine brought about improvement of the symptoms and disappearance of the entamoebæ, but the coccidia could still be seen. It is difficult to say to what degree the symptoms were due to the *Isofovea*. Attempts to infect four guinea pigs and a monkey were not successful. The authors refer to the experimental infection of *Isofovea belli* in man reported in 1948 by M. R. S. B. and NORAWA [see this *Bulletin* 1949 v 46 261].

H. Harold Scott

HAWAWI, A. & EL HOKDY, M. I. The Incidence of Balantidiosis in Egypt with reference to the so-called Process of Budding in *Balan. d. m. coli*. *J. Roy. Egypt. Med. Ass.* 1948 Dec 31 v 1 836-40 1 fig.

According to previous record human balantidiosis is very uncommon in Egypt. The present authors have investigated its incidence and have encountered only 3 cases in the course of 11. In 1948. The examination of 70 specimens of stools (pieces slaughtered in the Cairo slaughter house) led to *Balan. d. m. coli* in 80 per cent. of the samples. They then turned their attention to pig breeders in the suburbs of Cairo. The total of 119 owners and members

of their families in one suburb were negative, while in another suburb a single case of infection with *Balantidium coli* was detected among 27 persons examined. The authors believe that "The rarity of balantidial infection in Egypt may be due to the fact that the great majority of Egyptians are Mahomedans who are not allowed to eat the meat of pigs, or to rear them."

The authors have successfully grown *Balantidium coli* in a medium consisting of serum (human, equine, bovine or ovine) diluted with buffered Ringer's solution in the proportion of 1 : 10, with the addition of a small amount of rice starch.

Both in cultures and in natural infections they found a few ciliates producing bud-like outgrowths varying in size. Since these "buds" revealed no nuclei when examined in stained preparations they are not regarded as a form of multiplication of *Balantidium* and their nature remains doubtful. This condition of "budding" is shown in a photo-micrograph. C A Hoare

LEPROSY

LEPROSY IN INDIA 1949, Apr., v 21, No 2, 39-121 All-India Leprosy Workers' Conference, Calcutta, 29th to 31st December, 1948

This voluminous number contains little new information, as the views of the principal authors had been recorded in papers shortly before at the Cuba Conference. The table of contents lists the names and speeches of politicians and others, but not the medical papers, so every page has to be turned over to find the latter. Fortunately the few points of interest are summarized in Part II and include the following. The subject of treatment was opened by COCHRANE, who has made an advance on his former advice to limit the use of sulphones to the most experienced workers by going to the other extreme of pushing large doses without any intermission during reactions, except very severe ones, in all lepromatous cases, but he does not advise sulphones in neural macules, tuberculoid or neural anaesthetic lesions for fear of causing them to become lepromatous. DHARMENDRA is unable to understand this limitation. S N CHATTERJEE advises the injection of small doses such as 3.5 per cent watery solutions of sulphetrone and diasone to a maximum of 5 cc, which produce clinical improvement without reactions or anaemia. These first two workers advise the combined use of sulphones and hydnocarpates [as advocated by the reviewer, see this *Bulletin*, 1948, v 45, 614]. MUIR differed from Cochrane in finding sulphones useful in tuberculoid cases. TEICHMANN recorded the after-results of hydnocarpates in 105 cases, almost all lepromatous ones. Large doses gave the best results with 27.3 per cent disease arrested for a time at least, but results as a whole were poor, although definite reduction in the incidence of deformity occurred.

The control of leprosy was discussed on the second day without bringing out any important new points. The third subject for discussion was the histopathology and classification of leprosy. This brought out great differences of opinion and a tendency to ever-increasing complication of nomenclature.

L Rogers

BLANCO, F L & FITE, G L. Silvering of *Leprosy* Bacilli in Tissues. *Arch Pathology* 1948, Dec., v 46, No 6, 542-9, 8 figs

This is an important paper, which should be read in original by all interested in the bacteriology of leprosy and for the elaborate method used which takes

about five weeks to carry out. The organisms are stained black and brown with differences of intensity. In the most highly active lesions, parallel columns of bacilli radiate from the centre of the containing cell and are never in bundles as with leishman. These are abundant young growing bacilli. In the more common chronic lepromata the spaces in the vacuolated cells are free from organisms, which tend to curve round them and show a greatly diminished rate of multiplication. Many of the bacilli in old globi become progressively more weakly silvered especially those centrally placed—these are considered to be degenerated forms without change in morphology which supports the idea that in old lesions death of the bacilli is constantly taking place. Pleomorphism of the lepra bacilli is only marked in chronic lesions. In silvered preparations clear narrow halos are seen around and separating the organisms. A new concept of the nature of the globus is thus offered. Good illustrations demonstrate the above points.

L. Rogers

KARX R. L., BARIBEAU Betty J & VILLALON Flora T. Universal Serologic Reaction with Lipid Antigen. IV. In Lepromatous Leprosy. *Amer J Clin Path.* 1949 May 1 19, No. 5 408-13 3 figs. (Summary appears also in *Bulletin of Hygiene*)

Sera from 55 patients suffering from lepromatous leprosy were examined by the Universal Serologic technique and typical results are shown in one table and three figures. Marked precipitation is noted before incubation and is strongest in the presence of reduced NaCl concentration—after 4 hours in the ice box almost all serum dilutions show precipitation—complete in zones I and III nearly complete in zone II—after 24 hours incubation all zones show complete precipitation. In contrast to the foregoing in tuberculo-leprosy there was no difference in precipitation after 4 and 24 hours incubation. It is suggested that in lepromatous leprosy there is not only an increase over the normal liberation of tissue lipid but also liberation of distinctive lipids—serological patterns vary with the activity of the disease—differing according as to whether it is active or burnt-out—these may serve to distinguish between different forms of the disease and as an index of response to treatment.

T. E. Osmond

LASSMAN P. Traitement de la lèpre humaine avec les produits traités de graines des *Ocoteles* du Congo Belge. ('Treatment of Leprosy with Extracts of Seeds of *Ocoteles* from the Belgian Congo.) *Ann Soc Belge de Med Trop.* 1949 31 r 31 v 29 No 1 23-R.

This brief note records a trial in the treatment of leprosy of an oil extracted from the seed of a species of *Ocoteles* such as that from Calcutta which was found by Dubois to be well tolerated in man (this *Bulletin* 1947 79 857) and actively to inhibit the growth of a human tubercle bacilli in cultures but whose chemical nature is unknown. Trials in cases mainly lepromatous men by infiltration of the cutaneous lesions including lepromata of the ear and also intramuscularly, in doses up to a total of 30 to 150 cc per case has resulted in clearing up of the skin lesions, and the method is equally effective in leprosy. As no general reactions or toxic symptoms resulted further trial are indicated although cures are not claimed.

L. Rogers

STAIGLI J & DIBIZ, O. Primeiros resultados obtidos com bogaalita no tratamento de leprocos em Minas Gerais. First Records of the Results of Treatment of Leprosy in Minas Gerais with Bogaalita. *Pan Am J Med Biol Sci.* São Paulo. 1948, Feb. July 19 No. 17 19 29 3 figs.

Bogaalita methanal formaldehyde sulphoxylate sodium has been tried in leprosy on the grounds that oxygen is necessary for growth of *M. leprae*.

and that a reducing agent will interfere with that growth. The authors refer to the 12 cases reported by FERNANDEZ and BERGEL [see above] and then speak of 8 cases of their own, all patients in an advanced lepromatous stage, 5 from the Santa Isabel Colony and 3 from the Roça Grande Sanatorium. They gave the drug, first in glucose saline, later in distilled water [strength not stated, but Fernandez and Bergel gave it in 10 per cent solution], starting with 1 gm daily (except on Sundays) for a week, then 1 gm night and morning, and increasing until in the fourth week 3.5 gm were given twice a day, and this was kept up to the end of 8 weeks. As others have found, if it is injected too quickly nausea and vomiting might occur.

The results were little or no change in the blood, no reduction of red cells, but usually some increase and maintenance of the haemoglobin value, the bacilli became fragmented and stained poorly, there was less nasal obstruction, less dysphonia, and improvement in the general health, with better appetite and sleeping. Lepromata softened and broke down. These changes are illustrated by photographs. [This drug is used also in leishmaniasis, see above, p 926]

H Harold Scott,

NOEL R & SOEUR MARIE-SUZANNE. Du mode de propagation du bacille de Stefansky inoculé dans la membrane chorio-allantoïdienne de l'embryon de poulet. [Development of Stefansky's Bacillus when inoculated on the Chorio-Allantoic Membrane of the Chick Embryo] *Ann Inst Pasteur* 1949 June, v 76 No 6 535-8, 3 figs

GOMES, J M. Ação do promin sobre o Mycobacterium de Stefansky. Estudos morfológicos. [Morphological Study of the Action of Promin on Stefansky's Bacillus] *Arquivos Facul de Hig e Saude Pública Univ de São Paulo* 1948, June, v 2, No 1, 19-30. English summary [13 refs]

The author started with 36 rats which he divided into three groups. (1) Controls, inoculated with a suspension of triturated leproma tissue. (2) Similarly inoculated, but promin treatment started a month later and after 9 weeks' treatment there was allowed one week free and the promin was then resumed for another 2 months, the drug being used in a strength of 1 per cent in milk. (3) As the last, but a month after resumption of treatment, the promin was stopped and carotenoid (1 cc of a 0.1 per cent colloidal suspension) injected three times each week. One month later, the carotenoid was suspended and promin again given for 10 days, after which all treatment was stopped. Some of the animals died but 16 lived for 4-6 months and were killed and examined. The controls showed a non-ulcerated leproma with bacilli, some smooth and short, others granular. The promin-treated animals (group 2), 6 in number, also showed a leproma locally in the right inguinal fossa, in one apparently normal, one necrosed, two with ulcers cicatrizing and in two the leproma was regressing and fibrosed, bacilli some long and smooth, others fragmented, some with dark granules and the organisms in globi. Those in group 3 showed fibrosed or ulcerated remnants of lepromata, in only one were there bacillary globi, the majority were fragmented and granular.

It is thought that the carotenoid stimulates the vitality of the bacteria, *in vitro* the colonies of acid-fast organisms grow more strongly, but *in vivo* an allergy is thus set up which results in destruction of the organism.

Summing up the changes briefly. In the controls there was leproma formation without any tendency to ulceration and the bacilli were generally smooth, short and granular. In those treated with promin alone lepromata were present,

but mostly retrogressing long bacilli predominating and "resistant" forms. Those treated with promin and carotenoid showed lepromata frankly retrogressed (in two they had gone altogether) and the bacilli were some long some with dark granules and apparently degenerated forms.

H. Harold Scott

HELMINTHIASIS

NAQATY H. F. A Revised List of the Helminth Parasites of Man and Food Animals in Egypt. *J. Roy Egypt. Med. Ass.* 1949 May v 32, No. 5 423-5

See also p 878 COUDERT & JETTIN. A propos des méthodes d'enrichissement des sèdes.

HARLOW C. H. A Theory of Egg-Deposition by *Bulkowsia harmatobia*. *J. Parasitology* 1949 Apr. v 35 No. 2, 205-7

A French version of this paper has already been abstracted [see this Bulletin 1949 v 46, 732].

STANDEN O. D. Experimental Schistosomiasis. I. The Culture of the Snail Vectors *Planorbis boerri* and *Bulinus truncatus*. *Ann. Trop. Med. & Parasit.* 1949 Apr. v 43 No. 1 13-22. [13 refs.]

The successful establishment of aquaria for the growth and breeding of snail vectors of schistosomes in localities far removed from their native environment requires considerable care and attention to a variety of factors. In this paper the ecological requirements of the two important vectors, *P. boerri* and *B. truncatus* are described and discussed in relation to their culture in aquaria. Having outlined the habits of these two species including feeding and reproduction, the optimum conditions of temperature, light, aeration and pH of the aquaria are stated. The results of trials with various species of water plants showed that the most suitable forms are *Callitriche sp. alba*, *Eubryopsis palustris* and *Myriophyllum japonicum* which moreover are easily obtainable. The merits of other water plants are offset by certain undesirable characteristics.

For the maintenance of these snails under biologically balanced conditions a study was made of the rôle of protozoa and variety of aquatic invertbrates in the ecology of the snails. The harmful or beneficial actions of such forms as rotifers, oligochaet, crustacean and mollusc have been observed and are discussed. Of the crustaceans *Daphnia* plays an especially important part in controlling the numbers of unicellular organisms and the oligochaet act as useful scavengers of vegetable debris. The significance of the multiplication of other organisms as indicators of the general health of the aquarium is commented upon.

Detailed instructions are given as to the procedure to be followed in setting up a balanced aquarium for snail culture and for the successful maintenance together with useful hints as to the steps to be taken in the event of the appearance of signs of unbalance in the ecological environment.

J. J. C. Dwyer

ARIM M. A. & WATSON J. M. Comparative Efficiency of Different Methods of Packing the Snail Vectors of *Schistosoma haematodes* and *S. mansoni* for Transport by Air. *Ann. Trop. Med. & Parasit.* 1949 Apr. v 43 No. 1 39-40

Four well known methods of packing snails were tested in each case the snails were packed in wooden boxes 15 x 23 cm. with perforated lids. The

methods were (1) a layer of fine silver-sand, wetted to a paste, about 1 cm thick on the bottom of the box the snails were placed on this and a similar layer of wet sand placed on top of them, (2) as (1), with finely ground wood charcoal instead of sand, (3) open-ended tubes, 15 cm long and 2 cm in diameter, containing alternate layers of snails and wet dead leaves, the full tubes were covered with a double layer of fine-mesh gauze sealed in position with tape. The boxes containing the tubes were packed with more wet dead leaves, (4) a layer of wet pond-mud, about 1 cm. thick on the bottom of the box, with the snails on top of it and the rest of the space in the box filled with water-weed. This last is the method used for despatch abroad of snails from the Bilharzia Snail Destruction Section, Ministry of Public Health, Cairo.

The snails used were *Planorbis boissyi* and *Bulinus truncatus*.

All four boxes were placed in the shade for 72 hours (maximum daily shade temperature, 115°, 96° and 99°F).

After unpacking, the sand was very dry, the charcoal had caked, the leaves, mud and water-weed were quite moist.

The snails were removed under water, cleaned in running water at 27°C in a net and observed in aquaria for 24 hours. In the case of *P. boissyi*, the percentages of survivors in mud, sand, leaves and charcoal respectively were 97, 95, 94.5 and 90, corresponding figures for *B. truncatus* were 23.2, 2.0, 1.0, 11.0.

It is evident that packing in damp mud, in perforated wooden boxes with adequate air-space and covered with moist water plants was the most satisfactory. The results were borne out in the case of actual consignments sent abroad from Cairo (e.g. to Britain and to the U.S.A.).

Brief reference is made to other methods of packing for other species of snails.

H. J. O'D. Burke-Gaffney

DESA A. E. & MONTEIRO L. Urinary Schistosomiasis in India with a Report of One Case. *Indian J. Med. Sci.* 1949 June, v 3, No 6, 376-81, 2 figs on pl [16 refs].

Reference is also made to 9 previous cases in India.

ALVES, W. Miracil D in Urinary Bilharziasis. *South African Med. J.* 1949, May 28, v 23, No 22, 428-31.

BLAIR *et al* [this Bulletin, 1949, v 46, 556] have shown that urinary schistosomiasis can be cured by a 5-day course of miracil D totalling 75-100 mgm per kgm. In the present work, smaller doses were tried, *viz* —

(1) Sixty mgm per kgm given in six divided doses, twice daily for three days. Twenty young Africans were treated, nine complained of side effects such as nausea, headache or dizziness but there were no major disturbances. Four weeks later no living eggs were being passed in the urine and all twenty patients are considered cured.

(2) Sixty mgm per kgm given in four divided doses in four days to twenty young Africans. Only five complained of minor symptoms. Four weeks later, three of them were still passing occasional live eggs. Seventeen are considered cured.

(3) Seventy-five mgm per kgm in ten divided doses during five days, given to thirty-five young Africans. Nine had minor toxic effects. After four weeks all are apparently cured.

It is believed that patients who have not relapsed in four weeks are unlikely to relapse. "Miracil D appears to be a relatively non-toxic drug but it is extremely unpleasant to take and is definitely a gastro-intestinal irritant."

The subjects of these studies were schoolboys under discipline and patients in the Native Reserves might be less ready to take the treatment. Hot Mineral is strongly recommended for all cases where control can be exercised.

F. Hawking

MOORE D. V., YOLLES, T. A. & MELENEY H. E. A Comparison of Common Laboratory Animals as Experimental Hosts for *Schistosoma mansoni*. *J Parasitology* 1949 Apr v 35 No. 2, 158-70 1 fig

"The common laboratory animals (mice, hamsters, rats, guinea pigs and rabbits) were infected with *S. mansoni* by two methods: intraperitoneal injection and cutaneous exposure. The course of the resulting infection was studied and the following points used as a basis for comparing the suitability of the animals as hosts for *S. mansoni*: percentage worm recovery; time required for the worms to reach maturity; and the presence of viable eggs in the feces.

1. *Mice*. Animals infected with 100 cercariae yielded an average of 1.4 per cent. worm recovery following intraperitoneal infection and 22.9 per cent. following percutaneous infection. Eight weeks after infection 80-89 per cent. of the worms were mature. Viable eggs appeared in the feces 8-8½ weeks after infection and egg passage continued until the death of the animals.

2. *Hamsters*. Animals infected with 160 cercariae yielded an average of 17.9 per cent. worm recovery after intraperitoneal infection, 18.1 per cent. after unshaved percutaneous infection, and 29.2 per cent. after shaved percutaneous infection. Eight weeks after infection 80-87 per cent. of the worms were mature. Viable eggs appeared in the stool 5-6 weeks after infection and egg passage continued until the death of the animals.

3. *Rats*. Animals infected with 100-6000 cercariae yielded an average of 0.9 per cent. worm recovery following intraperitoneal infection and 7.3 per cent. after percutaneous infection. Ten weeks after infection 67-80 per cent. of the worms were mature but were smaller than in mice and hamsters. Eggs were never demonstrated in the feces at any time.

4. *Guinea Pigs*. Animals infected with 500-1000 cercariae yielded an average of 0.5 per cent. worm recovery following intraperitoneal infection and 22.9 per cent. after shaved percutaneous infection. Eight weeks after infection 82 per cent. of the worms were mature but were smaller than in mice and hamsters. Eggs were never demonstrated in the feces at any time.

5. *Rabbits*. Animals infected with 500-15000 cercariae yielded an average of 0.3 per cent. worm recovery following intraperitoneal infection and 11.8 per cent. after percutaneous infection. Seven to 8 weeks after infection 63-67 per cent. of the worms were mature but were smaller than in mice and hamsters. Eggs were never demonstrated in the feces at any time.

6. It is concluded that mice and hamsters are the most suitable common laboratory animals for experimental infections with *S. mansoni*. Rat as unsatisfactory hosts because very few worms develop to maturity. Guinea pigs and rabbits are of value only for producing large numbers of worms and must be infected by percutaneous exposure.

WATSON J. M. & AZIM M. A. Comparative Efficiency of various Methods of Infecting Mice with *Schistosoma mansoni*. *J. L. P. Med. & Parasit.* 1949 Apr 43 No. 1 41-6

The authors exposed mice to infection with cercariae of *S. mansoni* by eight different methods with the object of establishing their relative efficiency. The technique employed in each method is described and it was concluded from the results that the partial-immersion method ranks first provided that precautions

are taken against contamination of the water by urine and faeces of the mice, which are lethal to the cercariae. The cover-slip method ranks next in reliability but has the disadvantage of taking up much time and only allows a limited application of cercariae. The tube method and oral method were also successful but less constant in results than the previous methods. Inoculation by vaseline ring, subcutaneous injection and intraperitoneal injection all gave relatively poor results. There was complete failure by the gastric-injection method.

J J C Buckley

HITCHCOCK, Dorothy J. **Penetration Characteristics of *Schistosoma mansoni* Cercariae** [Research Notes] *J Parasitology* 1949, Apr, v 35, No 2, 216-17

To estimate the time taken for the penetration of skin by a schistosome cercaria, the process was observed under a magnification of 40× and strong illumination, with the use of cercariae of *S. mansoni* applied to hamsters. The average time for penetration, measured from the time of placing the cercariae on the skin to the time of their disappearance below the surface, was 4.3 minutes for the 75 cercariae observed, the range being 2 to 15 minutes. With the use of mice instead of hamsters, the average time for 50 cercariae was 3.6 minutes, with a range of 2.5 to 8 minutes. When placed on the skin, in a drop of water, the cercariae usually swam around for one minute and then crawled by means of the oral sucker. During penetration they were attached to the skin by the oral sucker, the body being perpendicular. The tail was in violent movement but only broke from the body when the latter had completely penetrated. [From the description, it might reasonably be inferred that the cercariae penetrated the skin when fully submerged and without the aid of an evaporating film of water. (See also OLIVIER, this *Bulletin*, 1949, v 46, 849)]

J J C Buckley

MEIRA, J. A. & SOARES, J. C. M., Jr. **A biopsia retal no diagnóstico da esquistosomíase mansoni** [Diagnosis of *Schistosomiasis mansoni* by Rectal Biopsy] *Arquivos Facul de Hig e Saude Publica Univ de São Paulo* 1948, June, v 2, No 1, 45-90, 9 figs on 5 pls [24 refs] English summary

The authors, after referring to previous reports on the results of rectal biopsy examination in cases of *S. mansoni* infestation, record their own results in 42 cases in which 53 such biopsies were made. They refer in some detail to the findings of HERNANDEZ-MORALES & MALDONADO who, in 1946, reported on 138 patients 50 of whom had had no treatment, while 88 had been given antimonials. Of the former all were positive by rectal biopsy, although less than half [the authors state 41.6 per cent, presumably 21 of the 50, but why not 42 per cent?] were positive by faecal examination. Of the 88 who had had antimony treatment 70.3 per cent [62 patients] were positive by rectal biopsy, whereas faecal examination diagnosed only 16 (18.2 per cent). Moreover, for the untreated patients an average of 3.3 faecal examinations were needed before a positive finding was obtained and 10 were needed for those treated [see this *Bulletin*, 1947, v 44, 330]. The authors then detail the results in their own cases, in which rectal biopsy and faecal examination were both made, the one to check the other. Sometimes repeated faecal examination proved negative (in one case as many as 14) although biopsy was positive. All had been sent in as suspicious of *mansoni* infection. Seventeen were positive by biopsy and 25 were negative, and though among the former examination of faeces might be persistently negative, in none of the latter were faeces positive and biopsy

negative. [They state that biopsy specimens may be taken repeatedly without inconvenience or mishap but in one patient there was such profuse haemorrhage that blood-transfusion was called for and as regards the inconvenience the evidence of the patient might not coincide with that of the authors and should certainly have more weight.]

H. Harold Scott

INGALLS J. W. JR., HUNTER, G. W., McMULLEN D. B. & BAUMAN P. M.
The Moluscan Intermediate Host and Schistosomiasis Japonica.
I. Observations on the Conditions governing the Hatching of the Eggs of
Schistosoma japonicum. *J. Parasitology* 1949 Apr., v 35 No. 2, 147-51

"The results from studies of environmental conditions which might be expected to influence the hatching of *S. japonicum* eggs indicated there is no effect on the rate of hatching as a result of the degree of intensity of illumination, agitation of fecal matter in the suspension, or osmotic stimuli. A diurnal or nocturnal cyclic frequency in hatching rates was observed. A temperature range of 23°C. to 30°C. was found satisfactory. The work indicated that to obtain consistently good results it is most important that the fecal material be thoroughly washed and the water in the hatching flask be clean and alkaline. The best miracidial yields were secured in water with pH 7-8. After hatching ceased in a flask, it was possible to obtain second and third yields by re-sedimenting the fecal material.

YOKODAWA, S. & RO, M. Studies on the Treatment of Paragonimiasis. Part III. Histo-pathological Changes in the Foci of Lungs, and in Fishes of Dogs experimentally treated. *Acta Hippologica Med. Trop. Taihoku* 1942 Aug 4 Nov. 1/2, 1-58, 24 figs. on 4 pls. (10 refs.)

[See this Bulletin 1941 v 28, 47]

LEITCH, J. W. G. Continuous Sedimentation for the Concentration of Trematode Eggs in Faecal Suspensions. [Correspondence] *Nature* 1949 June 11 190, 1 fig

An apparatus for concentrating trematode eggs is described which has the advantage of rapidly reducing the faecal debris to less than half and of washing away colouring matter with the loss of only very few eggs. It is specially adapted for use with sheep faeces which have a high proportion of debris and it has proved of value in recovering eggs of *Fasciola hepatica* and *Lar. mystusomum* etc. It consists of a U-tube having a funnel at the end of one upright arm and a spherical flask 4.5 cm. (shown in list 4.5 mm.) in diameter at the other from which liquid can be siphoned off. The apparatus is filled with water except for an air lock in the spherical flask ("distillation splash head") and the faecal suspension having first been passed through a sieve (40-meshes per inch) is placed in the funnel. The siphon is then opened and the suspension passes through but eggs and heavier particles settle at the bottom of the U-tube from which they are recovered.

J. J. Buckley

HARANT H. & MIDROUILLET Mme. Sur un nouveau cas de coenurus humain
[A New Human Case of Coenurus.] *Bull. Soc. Path. E. et* 1949 4
Vol. 56 173-4

The authors refer to the rarity of human infection by *Coenurus* and quote some of the few proved cases in the literature thus [Bulletin 1920 v 15 223 1932, v 29 54 and 416 1934 v 31 120 and 747 1941, v 39 631 and 872 also 1949 v 46 65 and 461].

They then give a brief account of a case in a peasant from the Department of Tarn. The patient was a deaf-mute and during a routine medical examination, a cyst about the size of a pigeon's egg was found in the left deltoid region. Operation showed that the cyst was partly embedded in the deltoid muscle and its wall was closely associated with the fibres. The cyst burst during surgical intervention, releasing a clear fluid. The cavity contained about 10 to 20 whitish granulations about the size of a pin's head. Microscopic examination revealed the presence of a coenurus which was identified as that of *Multiceps serialis*.
H J O'D Burke-Gaffney

COUTELEN, F, COCHET, G & BIGUET, J. Présence d'*Hymenolepis nana* dans le Nord de la France [*Hymenolepis nana* in the North of France] *Bull Soc Path. Exot* 1949, v 42, Nos 3/4, 106-11 [18 refs]

Six cases of *Hymenolepis nana* infection were recorded in the North of France in 1948 and all were autochthonous. Three were in a community of children, two were in one family and the sixth was an isolated case. Epidemiological investigation suggested a possible explanation of these infections.
H J O'D Burke-Gaffney

NEGHEM, R., FAIGUENBAUM, A., J., PILOTTI, A., M. & SILVA CAMPOS, R. Algunos aspectos epidemiológicos de la hidatidosis humana en Chile [Some Epidemiological Aspects of Human Hydatidosis in Chile] *Bol Oficina Sanitaria Panamericana* 1949, May, v 28, No 5, 469-77, 2 graphs

The English summary appended to the paper is as follows —

"From a study made of some of the epidemiological aspects of hydatidosis in Chile during a period of 12 years (1933-1945), the authors arrived at the following conclusions: the incidence of hydatidosis in Chile is low in relation to other common infections, though it must be said that during recent years the epidemiological curve has gone up; as to its geographical distribution, in varying degrees of intensity, it has spread throughout the country, although the disease has no special preference as regards sex, it occurs slightly more frequently in men; it is unknown in nursing children; the incidence is low in children under 10 years and in persons over 60 years old, and 90 per cent of the cases are found in persons from 11 to 59 years of age; the over-all death rate for this disease in Chile remains stationary although the death rate for the total number of persons affected with the disease has risen during recent years."

JOYEUX, C & BAER, J. G. L'hôte normal de *Raillietina* (R) *demerariensis* (Daniels, 1895) en Guyane hollandaise [The Normal Host of *Raillietina* (R.) *demerariensis* in Netherlands Guiana.] *Acta Tropica* Basle 1949, v 6, No 2, 141-4

Two cestode strobilae which had been collected from a howler monkey, *Alouatta seneculus*, in Surinam, were identified as *Raillietina* (R) *demerariensis*, a species which has hitherto been recorded only from man. The material is described in detail and the chief morphological characters of this species and of *R. alouattae* Baylis, 1947, which it closely resembles, are tabulated.

R. alouattae also occurs in the howler monkey, *Alouatta macconnelli*. The howler monkey is thus established as the normal host of two species of *Raillietina*, one of which is capable of infecting human beings.

J J C Buckley

BARR, J. G. KOURI P. & SOTOLONGO F. Anatomie position systématique et épidémiologie de *Iuermicapsifer cubensis* (Kouri, 1938) Kouri 1940 cestode parasite de l'homme à Cuba. [Anatomy Systematic Position and Epidemiology of *Iuermicapsifer cubensis* (Kouri, 1938) Kouri 1940, Cestode Parasite of Man in Cuba. *Acta Tropica* Basle 1949 v 6 No. 2, 121-30, 14 figs. [15 refs.]

"A detailed anatomical study of *Iuermicapsifer cubensis* based on the original material deposited in the School of Tropical Medicine in Havana shows that we are dealing with a single well defined species of this genus.

"Over one hundred cases have been recorded so far from the western part of the island. It is very likely however that this parasite will be found in other parts of Cuba as well as in Porto-Rico and Venezuela.

Children of the age 1-5 years and 9-11 years are most frequently infested. All cases except two have been recorded from white children.

"It is probable that parasitism is accidental and that the normal host will be found amongst the Cuban fauna. No systematic research has been made so far with this end in view. Among native rodents, *Julis* (*Capromytilorides* and *C. percherillus*) apparently do not harbour this worm.

Iuermicapsifer is discovered by finding the ripe segments, singly in the faeces. These cannot, however be distinguished from those of *Railletius* the presence of which in the West Indies, is quite possible. It is always necessary to recover the scolex and to examine it for the presence of the peculiar hooks of this genus.

RAYLIS, H. A. A New Human Cestode Infection in Kenya. *Iuermicapsifer arricanthus* sp. n. Parasite of Rats. *Trans. Roy Soc Trop Med & Hyg* 1949 May v 42, No. 3 531-4, 5 figs. [22 refs.]

Two strobilae of *Iuermicapsifer arricanthus* (Hofend, 1917) were evacuated, after anthelmintic treatment by a boy aged two from Kenya who had been passing tapeworm segments. The boy had lived in Nairobi until April 1948 when he came to England and some weeks later was admitted to hospital. The verminicide employed was filix mas, miliums 15 given with jam and honey in the evening and retained during the night. Early next morning syrup of figs, drachm 1 was given and the tapeworms were recovered in the stool.

In the fresh condition these measured about 2.5 cm. and after preservation were about 17.9 cm. and 18.5 cm. respectively with a maximum width of 3 mm. The segments numbered about 315 and 390 and, except for the terminal segments, were broader than long. As the species is new to medical literature the author gives a detailed and complete description of it based on this human material and a specimen from a rodent host. A hitherto unmentioned feature was noted in the excretory system, in which the ventral longitudinal vessels were seen to be 4 to 6 in number and to be interconnected by a network of transverse vessels.

This species has been recorded from rodent hosts in various parts of Africa. In the Sudan from *Arvicola niloticus kordofanensis* in Dahomey from *Arvicola niloticus rufinus* and *Oryzomys hypomelanus* in Nigeria from *Hylomys reticulatus* Lem. seems *stratus* (under *krump*) and *Rattus* (*Mastomys*) *crucis cristaticeps* in French Guinea from *Ptilomys* (Gould) *campanus* in Tanganyika, from *Rattus* (*M. ulmanni*) *concha micromelanus* and *Heliophobus argenteocinctus* *emini* in the Belgian Congo from *Rattus* (*Mastomys*) *concha* (subsp. n.) in Southern Rhodesia from *Mastomys natalensis* in S. Africa, from *Thalomys* (*M.*) *mergeri* and *Oryzomys* *moysi* (Alcock)

I. arvicanthidis has yet to be recorded from rodents in Kenya, it is considered that its present occurrence in a human host represents an occasional or accidental infection

With the interesting exception of *I. cubensis* (Kouri, 1938) recorded from human beings in Cuba [see this *Bulletin*, 1941, v 38, 113] *Inermicapsifer* appears to be an African genus and the suggestion is made that the Cuban species may have been introduced from West Africa. Moreover, the possibility exists that *I. cubensis* and *I. arvicanthidis* may be identical, as the author's comparison of the two species seems to indicate

The life-cycle of *Inermicapsifer* is unknown, but in other members of the Anoplocephalidae, in which this genus is placed, the intermediate hosts have been found to be mites. However, it is suggested that the vector of *Inermicapsifer* is more likely to be an insect, as its egg capsules appear too large to be swallowed by mites. The close resemblance of the egg capsules to those of *Railhetina*, of the family Davaineidae, certain species of which are transmitted by beetles and ants, supports the idea of an insect intermediary for *Inermicapsifer*, and if this should be confirmed by future researches, it would further establish the resemblance between the two genera and lead to a reconsideration of the present classification of *Inermicapsifer*

J J C Buckley

PATEL J C Ankylostomiasis as it faces the Practitioner *Indian J Med Sci*
1949 May v 3 No 5 339-48 [11 refs]

A general discussion and review

BEAVER, P C Quantitative Hookworm Diagnosis by Direct Smear
J Parasitology 1949, Apr, v 35, No 2, 125-35, 3 figs [11 refs]

The use of direct faecal smears in egg-counting for an approximate estimation of hookworm burden, is dependent on the assumption that the eggs are uniformly distributed in the faecal mass, and its value is impaired by the fact that faecal smears vary in volume and do not represent a uniform sample of faeces. The author devised a method of standardizing faecal smears and then applied it to determining the reliability of egg-counts of standard smears as compared with the Stoll dilution egg-count method.

To standardize direct smears, they are brought to a uniform standard density by means of a photo-electric foot-candle meter. A drop of water is placed on a slide and a small portion of faeces is mixed into it until an even density is obtained. It is then spread to a diameter of 16 mm and the slide is placed on the meter over an aperture of 16 mm diameter. Vertically above there is an electric lamp (75-100 watts) adjusted to give a reading of about 20 foot candles when a clean slide is placed over the aperture. Faeces are then added to the smear until the light is reduced to exactly 10 foot-candles. All forms of gross debris are removed from the smear before it is made up to the standard density. The eggs are then counted in the smear after it is covered with a coverglass.

Counts were carried out on stools from 10 different persons by this method (standard direct smear) and by a dilution method. Ten successive counts were made on each stool by each method. In another series five successive counts were made on 41 stools. Comparison of the two methods showed that they are about equally variable, the average of the coefficients of variation being 21 and 20 respectively in the first series and 22 and 25 in the second. The relationship between the number of eggs per slide and the number of eggs per cc of stool was also examined and a close correlation was found between the two methods. With the use of a conversion factor of 300, standard direct smear counts can be

interpreted approximately in terms of number of eggs per cc. on a formed-stool basis. Periodic egg-counts on stools from the same person gave results as uniform by standard direct smear as by dilution methods.

Investigation of the relationship between egg-counts and hookworm burden was carried out by egg-counts made by both methods followed by worm counts after treatment with tetrachlorethylene. From the results obtained it was concluded tentatively that each egg by standard smear count represents roughly 10 mature worms.

J. J. C. Buckley

CRUZ J. R., GUTTINGCO A. & KASILAG, Wilhelmina R. Observations on Hookworm Anaemia in the North General Hospital. *J. Philippine Med. Ass.* 1949 Apr. v. 25 No. 4 191-4

Hookworm anaemia has become much more prevalent than before in Manila during the last year 1947-1949. The authors attribute this to the Japanese occupation, but note that the widespread increase in hookworm infection took several years to produce an increase in cases of hookworm anaemia. Another factor is the present-day relative rarity of anaemia due to malaria and malnutrition.

The anaemia was usually of the hypochromic microcytic type but in 6 cases it was hypochromic macrocytic and in three hypoplastic or aplastic. Of 10 patients with aplastic anaemia died there was one other death in the series.

About 60 per cent. of 47 cases in this series were diagnosed at the first stool examination and about 14 per cent. required 3 to 7 examinations before ova were found.

Most of the patients required 2 or 3 courses and 3 required 4 courses of either heylresoreinol crystals 1.0 to 1.4 grammes, or tetrachlorethylene 3 ml. at intervals of 8 days. Despite these repeated courses 15 of the 47 patients were discharged with ova in the stools.

L. E. Napier

BRAY BLANQUET M. A propos de l'activité de l'essence de *Chenopodium ambrosioides*. (On the Activity of the Oil of *Chenopodium ambrosioides*.) *Bull. Soc. P. M. Exot.* 1949 v. 42, Nos. 3 & 4 116-18.

The French preparation, oil of *Chenopodium ambrosioides* locally grown in Montpellier which has anascaridol content of 60 to 80 per cent. was given to several patients with nematode infections in the doses usually prescribed for the American preparation, namely 1.0 to 1.5 ml. for an adult divided into three doses, given in the morning on an empty stomach. Intervals of an hour followed one and a half hours after the last dose by 30 to 40 grammes of sodium sulphate. For ankylostomes this is often repeated several times at intervals of not less than 10 days.

This dosage was given to 30 patients and was well tolerated except in one cardiac case. In one case of *Trichocephalus* infection there was a clinical and parasitological cure and in another a reduction in the number of eggs in the faeces.

Nine patients with ankylostomiasis were treated. Sometimes as many as 100 adult worms were passed within 48 hours. In all there was improvement in the symptoms and sometimes in the blood picture. In seven cases there was a clinical and parasitological cure the latter being confirmed by at least two stool examinations.

The best results were obtained with *Ascari* infections. Nineteen patients were given a single treatment of 1.0 to 1.5 ml. all were completely freed of the parasites the results being controlled by at least two stool examinations.

The author concludes that the French oil of chenopodium is as effective as that imported from the United States before the war and now unobtainable in France [This is the therapeutic trial with the locally manufactured oil referred to in this *Bulletin*, 1947, v 44, 1013 (HARANT, *et al*)] L E Napier

BRANNON, Mary J C & FAUST, E C Preparation and Testing of a Specific Antigen for Diagnosis of Human Strongyloidiasis *Amer J Trop Med* 1949, Mar, v 29, No 2, 229-39

"A test antigen prepared from clean filariform larvae of *Strongyloides* cultured from the feces of the chimpanzee and extracted in isotonic (0.425 per cent) salt solution or Coca's solution, in dilution 1:100 produced 23 positive intradermal reactions and 25 positive precipitin tests in 25 chronic cases of human strongyloidiasis. Additionally there were two doubtful intradermal reactions, one in a moribund patient and one in a patient who had very severe exfoliative dermatitis. The precipitin titers ranged from 1:5,000 to 1:30,000. This antigen produced consistently negative, doubtful or weak intradermal and precipitin tests in 105 of 108 presumably uninfected control cases.

"The diagnostic significance of the positive intradermal and precipitin reactions has been demonstrated in these cases of *Strongyloides* infection. The tests provide a reliable index of infection. In cases of presumably cured *Strongyloides* infection the value of the intradermal and precipitin test is not so clear. It is not known how long after cure the intradermal reaction will remain positive, although it is likely that the precipitin test as carried out indicates the presence of specific antibodies."

LIE KIAN JOE Helminthiasis of the Intestinal Wall caused by *Oesophagostomum apistomum* (Willach, 1891) Railliet and Henry, 1905 *Documenta Neerlandica et Indonesica de Morbis Tropicis* Amsterdam 1949, Mar, v 1, No 1, 75-80, 3 figs [12 refs]

Eight nodules were found at autopsy in the submucosa of the caecum and ascending colon of an Indonesian male, aged 45 years. The nodules were 7 mm to 10 mm in diameter, semi-globular in shape and inconspicuous, and when they were opened a living nematode was found in each of six of the nodules. Two nodules which were perforated were empty, but a dead female worm was found in the lumen of the intestine. Of the 7 worms, 4 were males and 3 were females. Histologically the nodules showed a wide cavity deep in the mucosa, surrounded by necrotic material and a thin layer of connective tissue, containing lymphocytes, plasma cells, other round cells and a few neutrophilic leucocytes. The necrotic layer tends to liquefy and it is assumed that the worm produces substances that dissolve the cyst wall.

The worms are identified as *Oesophagostomum apistomum* and a detailed description of their morphology is given and illustrated J J C Buckley

OCHSNER, A, DEBAKEY, E. G & DIXON, J L Complications of Ascariasis requiring Surgical Treatment. Report of Case with Abdominothoracic Complications *Amer J Dis Children* 1949, Mar, v 77, No 3, 389-407, 10 figs [Refs in footnotes]

Complications of ascariasis requiring surgical intervention have been frequently recorded in the literature. Since they are usually of a serious nature and offer a rather poor prognosis, it is imperative that the diagnosis be made early and treatment be promptly instituted. The types of lesion produced include mechanical obstruction produced by the adult worms and bacterial

contamination transmitted by its migratory habits. Since ascariasis is common in children a higher incidence of surgical complications would be expected in them but they are not infrequently encountered in adults. Ascarides may produce mechanical obstruction in any hollow organ such as the trachea, intestine, bile or pancreatic ducts and others. Intestinal obstruction from a bolus of entangled worms most commonly occurs in the lower ileum. Intussusception and volvulus may result from the irritation caused by the presence of one or more worms which do not necessarily obliterate the intestinal lumen. Ulceration and perforation of the small or large intestine may occur with migration of the worms into the peritoneal cavity. It is not uncommon to find ascarides in a suppurating or gangrenous appendix of 1 000 surgically removed appendices in a New Orleans hospital ova of *A. lumbricoides* were found in the faecal contents of 48. Migration of the parasite into the bile or pancreatic ducts leading to suppurative or haemorrhagic pancreatitis, has been frequently reported. Multiple hepatic abscesses, which may rupture into the peritoneal cavity or thorax are occasionally met with. The migrating larvae may cause bronchopneumonia, as was demonstrated by the Japanese brothers Koiso in 1922 (this Bulletin 1923 v. 20, 235) by experiments on themselves, and larvae and ova have been recovered from the sputum in cases of pulmonary infection which may proceed to empyema and abscess formation.

Diagnosis depends on recovering the ova from the stools or larvae or worms from the involved organ. A history of vomiting or passing worms is important and blood examination usually reveals anaemia and eosinophilia. An X-ray examination after a barium meal may show shadows due to the ingestion of barium sulphate by the ascarides. A rule however the diagnosis is rarely made before operation. The authors prefer hexylresorcinol as the anthelmintic before operation but warn against too vigorous employment of purgatives which may produce intestinal obstruction. At operation enterotomy and evacuation of the bolus is the only safe method but the length of bowel involved may be so great that this is not practicable. In such cases a temporary ileostomy may be performed. Intussusception and volvulus as best corrected without enterotomy though gangrene may necessitate resection. The treatment of perforation, general peritonitis or local abscess is on the usual surgical lines. Invasion of the gall bladder calls for cholecystectomy and in all such cases the common bile duct should be explored and drained. Hepatic abscesses are usually multiple and are treated by evacuation of the worms and drainage after packing off neighbouring organs.

The authors conclude with an account of a case of multiple hepatic abscesses in a child aged 20 months in whom after the evacuation of an abscess in the right lobe of the liver which contained 4 worms a similar mass was discovered high up on the dome of the right lobe too inaccessible to be dealt with at the time. This subsequently perforated the diaphragm and infected the thorax and the patient did not survive thoracotomy. At autopsy no worms were found in the cavity in the liver nor any in the intestinal tract.

A large number of references are summarized in this paper and there are several good illustrations.

(A review of this subject by H. MILWINSKY was summarized in this Bulletin 1946, v. 43, 508.) H. L. Harcourt

Wootman H. M. *Flaria* in the Anglo-Egyptian Sudan. *Trop. Med. & Hyg.* 1949 May 4, v. 6, 543-58. 1 map, 10 text figs. 5 refs.

Except for a small focus of *Haemeria lauranti* in the Nuba Mountains, filariasis is confined to the two southernmost provinces (the Sudan Equatoria

and Bahr el Ghazal Microfilariae only of *W bancrofti* have been found infrequently, no clinical cases have been diagnosed there recently

Loa loa infection is found from 6°N down well into the Belgian Congo and from French Equatorial Africa to 30°E. About 20 per cent of the native population are affected. " Its only proved vector is *Chrysops distinctipennis* and *C longicornis*, which occur in the ratio 26 : 1 " Its development in these species is much slower than that described by CONNALL and CONNALL [this *Bulletin*, 1922, v 19, 654] for *C silacea* and *C dimidiata*. Of 600 wild flies dissected, 0.6 per cent showed embryos of *L. loa* [sic ? 3 or 4 flies]. The author considers that these are probably not the main vectors in the Sudan. Other vectors are considered. In a species of *Haematopota* fed on an infected man some development occurred.

Acanthocheilonema perstans is found in 50 per cent of the native population in these southern provinces of the Sudan. *Culicoides grahami* is presumably the vector.

The hyperendemic area for *Onchocerca volvulus* lies between French Equatorial Africa and 30°E, and between 6°N and 9°N. South of this area occasional nodules due to this parasite are seen, but blindness is rare. Two surveys were made at points on the Sue river, at approximately latitudes 5°N and 6°N, in the former 50 per cent of persons selected (with nodules or other suggestive signs) showed microfilariae in their skins and in the latter 88 per cent. In the latter area 77 per cent of the apparently healthy population showed microfilariae, of 1,440 people in all, the percentage with nodules was 3.1 and with blindness was 0.48. The blindness did not all appear to be due to *O. volvulus*.

Antigen made from avian filariae was used for intradermal tests. 91.7 per cent of cases gave a positive result and 5 a weak positive [the nature of the cases is not stated].

L. E. Napier

WANSON, M. Essai de traitement curatif de la filariose à *Loa-loa* et de la filariose apériodique par les dérivés de la pipérazine [Therapeutic Trial of Piperazine Derivatives in Loiasis and Aperiodic Filariasis.] *Ann Soc Belge de Méd Trop* 1949, Mar 31, v 29, No 1, 73-80.

In his main series the author treated 10 Europeans and 36 Africans with hetrazan. In some subjects (not included in his main series) who did not take the full course of hetrazan, it was found that doses of 0.5-1.25 mgm per kgm three times daily for 10-21 days were ineffective and the number of microfilariae was unchanged.

In the cases of infection with *Loa* alone, the Europeans showed the usual symptoms, especially eosinophilia and prurigo. The 15 African patients were mostly without symptoms but in 4 of them (in whom the blood contained 500-800 microfilariae per 20 mm³) there was emaciation. Twenty-one of the African patients harboured both *Loa* and *A. perstans*.

The dosage was 2 mgm of base per kgm thrice daily for 10 days by mouth. This was well tolerated, even by the 4 heavily infected Africans. *Mf loa* disappeared rapidly from the blood within 48 hours.

Many of the Europeans complained of subcutaneous sensations resembling those caused by movements of the worms. There was also a transitory recrudescence of prurigo and other symptoms. After 48 hours, these symptoms gradually disappeared the prurigo being the last to go. In 5 out of 10 cases, the apparent cure has lasted 3 months. But usually in both races the symptoms return after 4-12 weeks and the patients request further treatment. Accordingly the author recommends courses of 15 or 21 days, repeated 2 to 5 times at intervals of one month. Such courses have led to great and prolonged clinical

improvement but it is premature to claim radical cure. Hetrazan is not effective against *Ancyrostrongylus*, *Trichostrongylus* or *A. colodinus* [but see this Bulletin 1949 v 46 835 where OLIVER-GONZALEZ *et al* claim that all worms [45.0m] were apparently removed from 3 of 6 patients after hetrazan]. Doses of 450 mgm. per day for 15 days have had no effect on 4 persons. F Hawk

LAGRANGE E. Essais de traitement des filarioses à *Loa-loa* et *O. colodinus* par le diéthylcarbamazine Cl₂. [Treatment of Filariasis due to *Loa-loa* and *O. colodinus* by Diethylcarbamazine Chloride.] *Ann Soc Belge de Méd Trop* 1949 Mar 31 v 29 No 1 19-22.

The author describes 3 cases of loiasis and 2 of onchocerciasis treated with Hetrazan i.e. diethylcarbamazine (this Bulletin 1948, v 45 532 1949 v 46 275 565).

Case 1—Male—47 years. Eighty-one kgm. with Calabar swellings for more than 18 months. No microfilariae in blood. He took 0.3-0.4 gm. Hetrazan three times daily for a total of 3 gm. Has remained free from symptoms 8 months.

Case 2—Male—60 years. Eighty kgm. Calabar swellings for more than 15 months. Microfilariae present in blood. The first two doses of 0.4 gm. Hetrazan caused pyrexia (38-2°C.) and rigors. Total dosage 3 gm. Four months later he had a relapse (Calabar swelling) which was not treated.

The third case was similar.

The other two cases are said to have been "*gale filariens*" although microfilariae were never demonstrable. When Hetrazan was given the usual allergic reaction was delayed or absent so the diagnosis remains doubtful. The patients seem to have improved after treatment. When Hetrazan is given to cotton rats infected with *Leishmanoides carini* it does not kill the adult worms. F Hocking

WATSON M. L. Hetrazan dans la période d'invasion de l'onchocercose (Hetrazan during the period of invasion of Onchocerciasis.) *Ann Soc Belge de Méd Trop* 1949 Mar 31 v 29 No 1 83-9

Hetrazan is effective in destroying the microfilariae of *Onchocerca* in the skin but it is less effective against the adult worms which completely resist the course of 21 days. Three months after such a course excision of nodules shows living and apparently normal adult males and females. The present paper refers particularly to a patient treated during the incubation period. A European aged 43 years was bitten on September 7th, 1948 by three *S. m. damnosum* which were afterwards dissected. One contained five infective larvae. Forty-eight hours later the calf of the patient's leg was oedematous, whit and itching for 2½ cm. around an insect bite. The patient had previously been exposed to *S. m. m.* bites but he had not previously responded in this fashion. On October 1st the swelling had spread round the ankle and was different from the usual reaction to *S. m. m.* bites. By October 15th, the skin resembled "*peau d'orange*" and was finely papular. During all November the patient suffered from lassitude and insomnia. On December 2nd, examination showed pachydermia of the lower part of the leg and of the dorsum of the foot with three hyperpigmented plaques. No microfilariae could be found but there was an eosinophilia of 14 per cent.

On December 3rd & 5th, there was a general urticarial reaction over the trunk and extremities, this was relieved by antihistamine treatment. By December 25th the local symptoms in the leg were worse and the patient had lost 3 kgm. in weight. Treatment was started with Hetrazan which immediately

caused exacerbation of the pruritus and local symptoms, controlled by Histaphen. The dosage of Hetrazan was 150 mgm three times daily for 17 days.

On December 31st, there was definite clinical improvement of all symptoms but there was intense lassitude.

On January 9th, the skin had become thin and supple again, and by February 28th the patient was completely cured.

This history is interpreted as being a developing infection of *Onchocerca* which was cut short by Hetrazan. [An interesting and instructive case, the original paper should be consulted for the full details] F Hawking

KERSHAW, W E Observations on *Litomosoides carini* (Travassos, 1919) Chandler, 1931 II The Migration of the First-Stage Larva *Ann Trop Med & Parasit* 1949, Apr, v 43, No 1, 96-115, 6 figs [29 refs]

"1 A series of experiments are described in which a direct, as distinct from an indirect, attempt was made to define the time taken by the first-stage larva of *Litomosoides carini* to migrate, immediately after birth, from the adult female, through the pleural space, to the peripheral circulation. With uninfected cotton rats as recipient hosts, adult female worms were transplanted to the pleural cavities, pleural exudate containing developing larvae was injected into the pleural cavities, and blood containing fully developed larvae was injected intravenously into the pleural and peritoneal cavities and into the subcutaneous tissues.

"2 The migration-time from each of these sites, though variable, was found to be commonly one day, though in one experiment larvae were found in the peripheral circulation one hour after the surgical transfer of worms. The variability in the results was too great for differences in the migration-rates of larvae in different stages of development to be defined, nor was the age of an infection found to affect the results.

"3 The persistence of the larvae in the peripheral circulation was found to vary from days to weeks or even months.

"4 These results are compared with observations on other filariae, and the necessity is stressed of observing host-parasite specificity and of using large numbers of larvae in such experiments, in order to allow for uneven distribution in the recipient host.

"5 The rapid and urgent development of the larva of *L. carini* to attain a form infective to the next host, and its persistence in the site where an optimum opportunity of transfer is presented, are compared with the corresponding developmental stages of other nematodes parasitic in man, animals and plants, and are found to be not inconsistent with them."

LAGRANGE, E Essais de chimiothérapie sur la filaire (*Icosiella neglecta*) de la grenouille (*Rana esculenta*) [Chemotherapeutic Studies on the Filaria (*Icosiella neglecta*) of the Frog (*Rana esculenta*)] *Ann Parasit Humaine et Comparée* 1949, v 24, Nos 1/2, 49-53, 1 fig & 1 pl

Frogs (*Rana esculenta*) collected at two places in France had an infestation rate of 15-35 per cent with *Icosiella neglecta*. Other frogs were obtained from Léopoldville and microfilariae (and a few adults) were found in *R. galamensis* and *R. occipitalis*. Antifilarial activity has been found in two of a series of compounds tested.

(1) Methyl violet This kills the microfilariae of *Dirofilaria repens* at 1-400 000 in 17 hours. When given intravenously to frogs it seems to have some action in killing or sterilizing the adult female worms although the microfilariae are unaffected. Unfortunately this compound proves toxic in the rat and the dog and high doses cause pulmonary oedema.

(7) Diphenylacetic U.C.R. (hydrochloride of oxyamino-phenyl-dichlorarsine or oxophenarsine). When this was given to a patient infected with *Loa* it caused transient improvement of his symptoms. When injected into frogs it caused death of most of the adult female worms although the microfilariae were more resistant. Many organic arsenical compounds show marked filaricidal powers against the adult worms of *Loa* in cotton rats.) F. Harsh.

SCHIFFNER W. & SWELLENGREBEL, N. H. Retrofection in Oxyuriasis. A Newly Discovered Mode of Infection with *Enterobius vermicularis*. *J. Paediatrics* 1940 Apr. 1, 35 No. 2, 133-48 6 figs.

Hitherto oral ingestion of the eggs of *Enterobius vermicularis* has been thought to be the only method of acquiring this parasite. During an investigation lasting for five years the authors discovered that another method exists wherein the larvae having hatched from eggs deposited in the perianal region re-enter the body via the anus and migrate upward to the caecum where they grow to maturity. For this unique helminthological phenomenon the new word "retrofection" is coined. Thus, to the existing knowledge concerning the well-lubricated machinery of dissemination and transmission which characterizes the life-cycle of what might justly be termed man's most personal parasite there is now added a further refinement of procedure whose implications have yet to be fully explored. The biological curiosity attaching to the life-cycle of *E. vermicularis* as exemplified by the external migration and death of the gravid females and the rapid incubation of the eggs is much enhanced by this finding which not only reveals an unparalleled phase in the known man-helminth relationships but opens up a new line of study in the wide range of hosts which harbour oxyurid worms. From the medical aspect it will explain much that has been perplexing about the refractory nature of pin-worm infections and it indicates at least one new approach in prophylaxis. Of importance too is the effect it should have in reducing if not obliterating the stigma of uncleanness which sometimes is unhappily associated with pin-worm infection in adults.

Before proceeding with the main theme of the paper the authors demonstrate by means of graphs showing the results of daily anal egg recoveries on infected persons over long periods of time that in the case of oral ingestion of eggs different pictures of the infection are produced by different modes of egg transmission. Three modes are discussed: 1. Direct transmission by fingers. 2. Indirect transmission or secondary contamination: food and fingers. 3. Dust-borne transmission.

1. Direct transmission from the anal region to the mouth: common in children rare in adults and produces a picture of chronic heavy infection, which is terminated at least temporarily by treatment.

2. This method involves both children and adults. In adults there is spontaneous self-cure in the absence of re-infection but in children self-cure is prevented by continuation of finger transmission. Less intense infections result from this method.

3. Dust-borne transmission: common in school where the environment is favourable and results in chronic but light infections which appear intermittently throughout the year. It is largely responsible for the widespread distribution of pin-worms.

Proof of the existence of the hitherto unknown retrofection was obtained experimentally and it was observed to have occurred naturally in circumstances which allowed no other possible interpretation. The idea had its inception in

the known fact that larvae have occasionally been found crawling on the anal region, having hatched out "precociously" and presumably to no purpose. In the experimental work, eggs were hatched out in artificial gastric juice and the larvae were applied to the sphincter portion of the anus in two human volunteers. One of these was treated thus with about 100 larvae and the other (the senior author of the paper) with about 150 larvae. Both subjects became infected after pre-patent periods of 76 and 43 days respectively. A third volunteer, aged 22 years, who had been proved negative for oxyuriasis for about 5 months previously, was inoculated perianally with 50 larvae and became positive after an incubation period of 76 days. Two of these subjects subsequently provided natural evidence of retrofection when, after a period of freedom from infection, they again became positive. Re-examination of previous data also confirmed the existence of retrofection.

It is remarked that retrofection probably occurs in children but is difficult to prove as it is likely to be masked by the occurrence of oral transmission. In adults, however, although as shown by the Amsterdam experiment it does not invariably occur, it should be suspected in all cases of chronic oxyuriasis. It would present a picture of recurrent infection at periods not exceeding the life-span of the worms, i.e. 37 to 93 days, since one generation must follow another in succession. "It will now be the task of the family physician to investigate to what extent retrofection is common in adults. Once recognized, termination of the infection can be achieved without drug therapy. Since it is known that these infections can end spontaneously, mechanical prophylaxis must be employed to achieve the goal of interrupting the chain of recidives. This is done by removing, for a certain period of days, the eggs from the anal region before the larvae have a chance to hatch, that is, every 6 hours, the time required for the enclosed embryos to mature in air."

J J C Bucklev

HANEL L & WEISS, R. Beitrag zur Wurmithherapie [Contribution on the Treatment of Helminthiasis] *Deut med Woch* 1949, June 10, v 74, No 23, 745-6

The author refers to previous correspondence on the treatment of enterobiasis and tells of the success he has had with phenothiazine, known also under the names dibenzothiazine and thiodiphenylamine, commercially as Contaverm, the dose being one tablet thrice daily for a child, two for the adult. It is insoluble in water or dilute acid or alkali. When oxidized it becomes more soluble, is absorbed and excreted in the urine which it colours a reddish brown. It does not cause untoward symptoms such as nausea and vomiting as may crystal or gentian violet. Some have reported it as causing anaemia [this *Bulletin*, 1946, v 43, 940] but that, in the authors' opinion, was due to excessive dosage. They gave 7 gm in 4 days, whereas the present authors advise doses up to 6 gm spread over 5 days, for a patient weighing 60 kgm and dosage according to weight, not age. For children he gives 7 to 15 tablets of 'Contaverm', i.e. 1.4 to 3 gm of phenothiazine, spread over 5 days. Details are given of two patients, a boy of 5 who had had the infection for two years, and a woman of 37 years. Both had had intractable pruritus and resultant eczema. These distressing symptoms cleared up in 4-5 days and the worms a day or two later, the dose being one tablet thrice daily for the child, two for the adult. Although the symptoms cleared up the course was repeated after an interval of three weeks, the child being given half the former dose. During observation for several months there had been no signs of any recurrence.

H Harold Scott

lesions were confined almost entirely to the Purkinje cells, which showed acute hyaline necrosis.

These findings accord with clinical experience in human cardiac beriberi. Initial biochemical changes causing disturbance of the conducting mechanism are reversible but may develop into irreversible morphological lesions.

Dean A. Smith

AUFFRET C. & TANGUY F. *Considérations sur 139 dosages de vitamine C dans le sang de militaires africains de différentes unités de Dakar*. [Notes on 139 Estimations of Blood-Vitamin C Levels in African Soldiers.] *Bull. Méd. de l'Afrique Occidentale Française* 1948 v 5 No. 1 77-80.

Of 99 soldiers of different races and varied length of service at Dakar 77 had blood ascorbic acid levels of less than 4 mgm. per litre. All but three of a group of 40 recruits from Dahomey showed similarly low levels and in none did the level exceed 7 mgm. per litre. These levels indicate definite depletion. Bleeding gums were found in some subject of the latter group but frank scurvy was rare.

The authors discuss the relationships of vitamins C and 1 to each other and to the causation of the haemorrhagic manifestations associated with scurvy and pre-scurvitic states. [They quote numerous authorities but give no references.]

Dean A. Smith

AUFFRET C. & TANGUY F. *Vitamine C dans les organes d'enfants et d'adultes africains de la région dakaraise*. [The Vitamin C Content of the Organs of African Children and Adults in the Dakar Area of French West Africa.] *Bull. Méd. de l'Afrique Occidentale Française* 1948 v 5 No. 1 167-72.

Estimations of vitamin C were carried out on the liver, spleen, pancreas, kidneys, heart and suprarenals of 27 persons who had died of apparently non-nutritional causes. The results were compared with those found in three tuberculous subjects whose ascorbic acid excretion measured shortly before death had indicated saturation.

The average levels in the nutritionally normal subjects were much lower of the order of half than those in the saturated subjects.

Although none of the persons showed any clinical evidence of deficiency the authors consider that their functional efficiency and capacity for work must have been greatly impaired. A plea is made for extended dietary use of the many good fruit and vegetable sources of vitamin C available locally especially the fruit *Dalmanella senegalensis*.

Dean A. Smith

See also p. 913 RAOULT, AUFFRET, TANGUY & MARTIN. L'acide ascorbique dans le traitement de la fièvre bilieuse hémoglobinurique.

SPRUE

SAINT-ETIENNE J. *La sprue tropicale*. [Consideration pathologique.] *Observations on the Pathological Features of Tropical Sprue*. *Méd. Trop.* Marcellin. 1949 Nov-Dec v 8 No 5 571-86. Numerous refs.

This article is a résumé of the various investigations conducted mainly by Anglo-American workers during the recent war. This renders it almost impossible to write a summary of the numerous investigations which have been adequately reviewed in this *Bulletin*.

There are several misprints especially with reference to the spelling of English names.

L. Manson-Bell

WOODRUFF, A. W. Aetiological and Prognostic Features in Tropical Sprue. A Study of 47 Cases over a 2½-3 Year Period. *Trans Roy Soc Trop Med & Hyg* 1949, May, v 42 No 6, 605-12, 1 fig [12 refs]

The subjects of the paper are 47 patients with tropical sprue admitted to an R A I mobile field hospital serving members of the Air Force in the Chittagong area, from July 1944 to June 1945. "There was a tendency for the cases to occur in small groups among personnel of individual units."

A figure shows that the rise and fall of the monthly incidence curve of the 47 cases of sprue (month of onset of symptoms) almost coincides with, but actually slightly precedes, the incidence curve of 72 cases of amoebic dysentery. The peaks fall in July and the trough of the sprue curve from November to March.

The duration of service in India before onset was 6 to 12 months in 27 per cent, 12 to 18 months in 16.2 per cent, 18 to 24 months in 16.2 per cent, 24 to 30 months in 19 per cent, 30 to 36 months in 16.2 per cent, and 3 years and over in 5.4 per cent.

The most frequent symptoms were—diarrhoea in all cases, with an average duration of 17.3 months, tongue lesions in 39 including 19 with active ulceration, loss of weight in all cases, average loss 28 lb, abdominal distension and flatulence in all, severe in 20 cases. Less constant symptoms were loss of appetite, nausea and vomiting, and cramps in the legs. Anaemia was not a striking feature, the average red cell count was 3.94 million, and the colour index 1.06. Faecal fat was estimated in 22 cases, the total fat was 37.12 per cent of dried faeces and the split fat 28.64 per cent. Split fat was therefore 77.15 per cent of total fat.

At the end of 2½ to 3 years the author was able to trace 34 patients. All were in full work. Twenty nine had gained weight and the average gain in weight of the 34 patients was 24 lb. All patients stated that they were free of diarrhoea, but 23 had had some diarrhoea, usually of a very transitory nature, at some time since their return to Britain. 6 men had had 4 or more attacks of short duration and 3 others one attack lasting 1 to 2 weeks. Eleven complained of ulcers on the tongue at some time. Occasional attacks of abdominal discomfort and distension were complained of by 6 men and frequent attacks by 3 others. Only 3 men considered that their energy was still somewhat impaired.

L. I. Napier

LOX, H. J. A Comparison of Pteroylglutamic Acid and Liver Extract Maintenance Therapy in Sprue. *New England J of Med* 1949, May 10, v 240 No 20, 801-3.

There have been conflicting reports on the haematological response of sprue to treatment with synthetic folic acid. Seven patients with sprue, all previously treated for years dietetically and with liver and vitamin preparations, were given synthetic folic acid for at least a year. In general the effect was beneficial, in the majority of the patients there was a lessening of diarrhoea and a corresponding increase in weight, in spite of a daily oral dosage of 60 mgm. of folic acid sufficient to increase to 100% the plasma folic acid levels, and other manifestations of severe sprue. The proved as non-positive to purified liver preparation as to folic acid, but responded to massive intravenous doses of synthetic liver preparation. The requisite dose of folic acid in the cases which benefited by the latter was found to be from 15 to 30 mgm. daily, or 5 mgm. only daily. This deficiency of folic acid is not a simple one. In spite of the demonstrated deficiency of folic acid in the plasma, the liver preparations were found to be more effective than folic acid in the treatment of the disease.

A. K. D. Adams

HAEMATOLOGY

CORRECTION

In his abstract of a paper from the *Lancet* by LEHMANN on Macrocytic Anaemia in Central Africans [this *Bulletin* 1946 v 46 (34)] the abstracter queries the use of the word "coctile." The word should in fact have been "precoctile." Since the paper was written a note has appeared in the *Lancet* of 1949 January 22nd, 199 in which it is explained that the word "coctile" was printed in the original article through a series of errors, and the editorial explanation goes on to state —

"Dr Lehmann's paragraph introducing the word should have read as follows —

"The reticulocytes and cells in the early postreticulocytic stage are here called precoctile cells. By precoctile blood picture is meant one due to a condition where large cells are produced in regeneration, the macrocytosis not being due to a disturbance of bone-marrow function by the absence of essential nutrients but being, on the contrary, caused by a hyperactivity of the marrow which leads to an emission of slightly unfinished cells (coctus=fully mellowed). To call these cells immature might suggest an inhibition of cell production at the nucleated stage and the term regenerative would not differentiate from a state where regeneration proceeds without macrocytosis.

FATEL J. C. & BERNARD Y. M. Synthetic Folic Acid in Tropical Macrocytic Anaemia. *Indian J. Med. Sci.* 1949 June v 3 No. 6 267-75.

An account of six cases.

SEYR H. J. Cooley's Anaemia: Report of a Case. *Med. J. Australia* 1949 Apr 30 v 1 No. 18 579-81, 1 fig.

Stated to be the first recorded case in Australia.

SCHWARTZ, S. O. & MARIN J. Mediterranean Anaemia in the Negro. A Report of Four Cases and their Families. *Blood* 1949 June v 4 No. 6 706-14 figs. 28 refs.]

Four cases of Mediterranean anaemia are reported in Negroes.

"The hematologic and clinical findings of available relatives are presented.

The disease in the Negro resembles the condition as found in people of Mediterranean ancestry in every particular."

VAN DER SAR A. De sikkelcellekte. Sickle-cell Anaemia. *Ned. Tijdschr. v. Geneesk.* 1949 June 4 v 83 (1) No. 23, 1807-74 5 figs. on pl. (Refs. in footnotes. English summary)

A full review of the literature of sickle-cell naemia is given and the symptomatology reviewed. Three negro sisters are then described all of whom had sickle-cells in the blood and had recurrent crises with fever, icterus and anaemia. All have so far recovered from their crises. The family history is given both parents had sickle-cells in the blood without symptoms. Of the ten children, all five sons were free from the disease, two daughters had latent sicklaemia and three daughters had recurrent sickle-cell crises.

These cases occurred in Curaçao. Blood examinations were carried out on 2,498 inhabitants, of whom 10.7 per cent. had sickle cells in the blood, 8.4 per cent. males and 1.3 per cent. females.

Striking changes in the bones are seen in these cases, mainly thinning of the cortical bone, osteoporosis and variations in density. The skull often shows a phenomenon termed "hair on end sign" or "*signe en brosse*", the outer table disappearing and the diploë appearing striated.

The spleen also shows marked changes, including calcification. Treatment is symptomatic. Splenectomy has proved disappointing. *A L Winner*

VENOMS AND ANTIVENENES

CECCALDI, J, TRINQUIER, E, ARNOULT, H & PELLISSIER, A. Sur quatre cas d'envenimation par morsures de "vipéridés" observés à l'Institut Pasteur de Brazzaville (Afrique Équatoriale Française) [Four Cases of Snakebite at the Brazzaville Pasteur Institute.] *Bull Soc Path Exot* 1949, v 42, Nos 1/2, 38-43

These four cases occurred among the employees at the Pasteur Institute, Brazzaville, French Equatorial Africa. One was bitten by a *Bitis arietans*, one by *B. nasicornis*, and two by *B. gabonica*. The symptoms were very similar in kind, though varying in degree. Three were bitten on the right thumb (one of them twice) and the other on the left hand. The symptoms were severe pain, rapid and extending swelling and, later, haemorrhage. All recovered in a few days, but in the case of the first there was some residual weakness of the muscles and stiffness of the forefinger, though 6 years had elapsed. One of the *B. gabonica* was only 3 weeks old, but the effects of its bite were very serious and a second injection of antiserum was called for. The dose given was 20 cc. In the case of the attendant bitten by *B. arietans*, the antiserum was obtained from the South African Institute for Medical Research, one of those bitten by a *B. gabonica* received the locally prepared antivenin, for the other two the source of antivenin is not mentioned but would appear to have been the Johannesburg Institute serum. The locally prepared serum is polyvalent for the Viperidae *B. gabonica* and *B. nasicornis*, and the Colubridae *Naja nigricollis* and *N. melanoleuca*. Other local snakes are *B. arietans*, *Causus rhombeatus*, *A. squamiger*, *Dendraspis* and *Boulangerina annulata*, but these are rarely caught so that their antivenins are prepared locally only occasionally.

H Harold Scott

ABALOS, J W. Cuales son los animales venenosos de la Argentina? [What Poisonous Fauna are there in the Argentine?] *Universidad Nacional de Tucuman. Instituto de Medicina Regional. Publicación No 481* 1949, 24 pp, 16 figs

This article names the commonest of the venomous animals—including in this term fish, snakes, spiders and scorpions—to be found in the Argentine. The author adds a few remarks on some of these, but of an elementary character.

In the section on snakes the author indicates by diagrams the different dentition of the aglypha, opisthoglypha and proteroglypha and then proceeds to name the chief species, namely, *Crotalus terrificus*, 7 species of *Bothrops* (locally known as *jararã*) of which the chief are *B. atrox*, *B. colliara*, *B. jararaca* and *B. jararacussu*, the others being *B. alternatus*, *B. neuwiedi meridionalis* and *B. ammodytoides*, three species of coral snake, *Micruis lemniscatus*, *M. corallinus* and *M. frontalis*, the first of these found all over the Argentine. There are also several species of "false coral snake", very like the true venomous ones, but the peculiar colour markings are only on the dorsum whereas in the

true Coral snakes the markings go quite round the body. A line map shows clearly the distribution of the snakes mentioned. There is also the "black snake" *Pseudoboa olivacea* a mortal enemy of the poisonous snakes which it fights relentlessly and eats when it has subdued them. It is coloured a slaty black dorsally, dull white ventrally with some red scales on the sides. It is about $2\frac{1}{2}$ metres in length, is slender and agile. It does not attack man and does not resent being handled.

Of spiders the most venomous is *Latrodectus* especially *L. mactans* (the Black Widow) and *L. geometricus*. There are says the author 40 species of scorpion in the Argentine but the only one mentioned by name is *Tityus tritatus* which gives a painful sting but without sequelae. The venom of some "appears to have an analgesic effect." The whole subject of scorpions and their venoms in the Argentine needs to be studied.

H. Harold Scott

DERMATOLOGY AND FUNGUS DISEASES

MONTELL M. L. R. Dermatitis verrucosus hyperkeratosiques. [Hyperkeratotic Verrucous Dermatitis.] *Bull Soc Path Exot* 1949 v 42, No. 5/6 190-97, 4 figs. on 2 pls

The following is a translation of the author's summary.

Three cases of verrucous dermatitis seen in Cochín China are recorded. The attention of clinicians is drawn to the hyperkeratosis of the lower limbs so frequent in the tropics and of which the nature, aetiology and pathology are very obscure.

(The paper is illustrated with four photographs of lesions of the foot.)

H. J. O'D. Burke-Gaffney

DI PIETRO A. NIRO F. L. & COSTA L. P. Histoplasmosis o reticulohistiocitosis paratuberculosa con localización lingual. [Histoplasmosis of the Tongue.] *Rev Asoc Med Argentina* 1949 May 15-30 v 63, No. 633/634 223-31, 6 figs. 27 refs.

The English summary appended to the paper is as follows:—

"In a man 55 years old, the authors report the clinical and histopathological study of localized Darling's histoplasmosis or paratuberculous reticulohistiocytosis of the tongue by *H. deplumans* *fruticum*."

"This case would be the 4th of histoplasmosis in Argentina."

BASE H. E., SCHOMER, A. & BERKE, R. Question of Contagion in Coccidioidomycosis. Study of Contacts. *Amer Rev T Vermon* 1949 June v 54, No. 6, 637-5.

It is probably true of all the systemic mycoses, caused by "dimorphic" fungi, that infection is not transmitted directly from man to man except in rare accidental cases associated with post mortem examinations or surgical operations. However ROSENTHAL & ROUTEN (this *Bullet* 1949 v 43, 467) by instilling directly into the bronchial tree of guinea-pigs the infected sputum and pus from human cases of coccidioidomycosis, succeeded in infecting the animals and thus they contended was evidence of the probable direct transmissibility of the disease. The present paper which is a timely relation of the view of Rosenthal and Routen as to natural infection in man is concerned, records the careful observations made on 11 intimate contacts

(wives, sons, daughters, brothers, sisters, etc) of 7 ex-soldiers suffering from persistent coccidioidal infection, six with pulmonary cavitation and the seventh with disseminated disease involving both skin and lungs. The periods of exposure of the contacts ranged from 6 months to 5 years, and all the persons concerned were resident in New York City, far removed from the endemic centres of the disease. The observations on the contacts, which included repeated coccidioidin skin tests and X-ray examinations of the chest, yielded no evidence whatsoever of infection.

J T Duncan

TROPICAL ULCER

RAO, V R, KINI, M G & SUBRAHMANYAN, K S **Tropical Ulcers in Madras City** *Indian Med Gaz* 1949, Mar, v 84, No 3, 88-92, 15 figs on 3 pls [10 refs]

This article is based on 38 cases of tropical ulcer treated at the Stanley Hospital, Madras, from December 1946 to the end of February 1948. No age was immune but most of the patients were below 30, and 32 were males and 6 females. Those employed in hard labour and living in insanitary conditions were more prone to this condition than others (19 out of 38 cases). Most of the patients had a history of a fortnight to a month's duration and the general experience was that the maximal incidence occurred during and after the monsoon months (in 1947 the monsoon failed in Madras). Fifteen patients had multiple ulcers and there were 60 ulcers in 38 cases, one patient having as many as eight. Except in rare instances the ulcers were found below the knee, and were "of the size of a pea to that of the old silver rupee or even bigger in a few cases". They were very painful and acutely tender, and the general condition of almost all the patients was poor.

Fusiform bacilli and *Treponema vincenti* were found in most cases, but one showed only spirochaetes and a mixed infection of staphylococci, streptococci and *Ps pyocyanea* without fusiform bacilli [was this a case of true tropical ulcer?]. The culture medium used consisted of nutrient broth 100 cc, agar 1.5 gm, sterile defibrinated human blood, 25 cc. Difficulty was found in obtaining pure cultures by surface inoculation. In 13 cultures fusiform bacilli were grown in 6 cases.

On admission every patient was given a wash with sterile normal saline and thereafter a saline dressing was applied for 24 hours, during treatment repeated study of the organisms was made. Out of 60 ulcers, 48 were treated with penicillin in a strength of 1,000 units in one cc of pyrogen-free distilled water, this was with a Holmspray and the ulcer covered with a sterile dressing. With full compression of the rubber bulb the amount of penicillin sprayed amounts to 270 units. The dressing was changed once daily and all cases were treated as out-patients. Penicillin was discontinued as soon as the ulcer began to heal and the discharge became scanty, thereafter a thiazamide paste or a 1 per cent aqueous solution of gentian violet was used. Large ulcers took an average of 28 days to heal and the average amount of penicillin required for a case was 1,300 units (maximum 7,000). With 2 or 3 dressings even the worst cases were relieved of pain and the discharge was lessened. Eight ulcers were dressed with Marfanil powder (para amino methyl benzene sulphonamide hydrochloride). When *Ps pyocyanea* or *Proteus* was present response to penicillin was poor, but Marfanil was found to be effective. The cost

Marfanil is high and penicillin is regarded as the drug of choice in the ordinary case. [No reference is made to any attempt to treat the general condition of the patient.]

C. F. Sherrin

8. OLL, H. Zur chirurgischen Behandlung des tropischen Ulcus. [The Surgical Treatment of Tropical Ulcer.] *Acta Tropica*. Basle, 1949 v. 6 No. 2, 145-9 5 figs.

MISCELLANEOUS DISEASES

- SPITZER H. Essential Hypertension on the Island of Curacao. *Ann. II Intern. Med. & Surgery* 1949 Apr., v. 3 No. 4 133-5.

The incidence of hypertension is very high both in the coloured and indigenous white population in the island of Curacao and this investigation was done to determine the relationship between constant dehydration and hypertension, the study being based primarily on an examination of school children. Most of the children were coloured, they were of both sexes between the ages of 6 and 18, and of average health. More than 1,000 diastolic and systolic readings were made by the auscultatory method and 888 school children were examined; the remainder were adults, most of whom had hypertension.

School children. The readings were based on the systolic level as it was found that the diastolic rise followed the systolic (for some delay). The degree of hypertension was striking: thus 7 children between the ages of 10 and 18 had a blood pressure of over 160 mm. while 2 aged 6 years had one of 130-139 (systolic). In all the age groups the average was well above the normal. Over 100 blood volume estimations were done by the Congo Red method, which gave consistent results on repeated application to the same patient and there was correlation between deficit in blood volume and increase in blood pressure.

Precipitation per year in Curacao averages 20 inches and there is continuous sweating, although not comparable to the amount seen in desert area. Hypertension in Curacao does not appear to be related to race as white people born on the island or who had immigrated in infancy also showed high incidence of this condition.

The author's conclusions may appear debatable and the observations should be repeated in other parts of the world with a similar climate.

C. F. Sherrin

- DIEZ DE URDIA IRI A. & ESTRADA BERG J. Ecthyma. Scleroma. *U.S. Clin. Mexico*, 1949 May 25 v. 29 No. 580 187-9 17 figs.

The authors prefer the term scleroma to chancroid because the disease attacks other parts than the nose. In one record of 338 cases the local cords were attacked in 18.4 per cent., the upper part of the larynx in 12.9, the lances in 4.1 per cent. The accompanying *Ehrlichia bacillus* or *Klebsiella rhinoscleromatis* has not been proved to be the actual cause because experimental inoculation has so far been negative.

Pathologically the authors recognise three stages: 1. Atrophic phase in which the secretion contains the organism. 2. Nodular in which the tissue shows Mikulicz cells and Russell bodies and there is infiltration of the nasal cartilage and, perhaps pharynx and larynx. 3. Cicatricial. Scleroma and carcinoma may coexist. The treatment suggested comprises taroacetic

with results at best very dubious, X-rays and radium, and streptomycin, 0.5 gm morning and evening, to a total of 30-40 gm. After a week of this, symptoms of deafness, tinnitus and vertigo are likely to arise. Four cases are mentioned, but with little detail, in two, operative treatment—extirpation—was carried out, in the other two nothing is said about treatment. There are good photographs of this horrible condition [see this *Bulletin*, 1949, v 46, 872] H Harold Scott

PRIEST, W M Acute Meningo-Encephalitis of Uncertain Origin in West African Troops *Trans Roy Soc Trop Med & Hyg* 1949, May, v 42, No 6, 581-96, 4 figs (3 on 2 pls) [29 refs]

There is a large and growing literature on the neurotropic viruses but little is known about their clinical manifestations in the tropics and few reports have appeared on this subject. The 10 cases here reviewed, mainly from the clinical standpoint, and coming chiefly from Nigeria, were in-patients aged between 19 and 36. Nine occurred during December to March, the driest and hottest time of the year. The cause was believed to be a filterable virus, although as experimental animals were unavailable, definite incrimination of a specific virus was not possible.

The cases described are all examples of an acute illness with sudden onset, fever, headache and in some instances, meningismus, cranial palsies, hemiplegia and monoplegia. A variable pleocytosis was present in the cerebrospinal fluid together with a marked rise in protein content. Xanthochromia was present in 5 instances (3 fatal). Six of the cases were fatal, and the author considers that the facts suggest infection with a neurotropic virus.

Trypanosomes were not found in the cerebrospinal fluid and no glandular enlargement was present. Of the first 8 patients the 2 who survived received no trypanocidal treatment, and in those who died there were no signs of trypanosomiasis.

A positive blood Kahn is so frequent in West African patients that its presence carries very little weight. Cerebral malaria is rare in West African troops, and moreover all these patients were given parenteral quinine or mepacrine without therapeutic effect.

No evidence of tuberculosis was found in the meninges or elsewhere in any of the fatal cases. None of the patients had been recently vaccinated.

The incidence of neurotropic viruses in the tropics is now increasingly well known. HAMMON and REEVES [*Bulletin of Hygiene*, 1946, v 21, 14] state that evidence is accumulating that there are a large number of such viruses of man and other animals (arthropod-borne) of "world-wide distribution and no small importance". Search for immune bodies to West Nile virus has shown their presence in the sera of Africans over a wide area of Central Africa. Others such as that called "Semliki Forest virus" [SMITHBURN and HADDOW, this *Bulletin*, 1945, v 42, 320, 1946, v 43, 859] have been identified, but little is known of the diseases caused by them in man. C F Shelton

ALAIN M, SAINT-ETIENNE, J & REYNES, V La melioidose. Considerations étiologiques, cliniques et pathogéniques à propos de 28 cas. [Aetiology, Clinical Features and Pathology of 28 Cases of Melioidosis] *Méd Trop* Marseille 1949, Mar-Apr, v 9, No 2, 119-42, 10 charts [Bibliography]

The authors report 28 cases of melioidosis from Cochinchina and give full clinical details of 10 cases which illustrate the protean manifestations of the

acute subacute and chronic forms. Nineteen patients are known to have died but a number could not be traced—three have survived for four years after clinical cure. Treatment appears to have been largely surgical.

In no case was the source of infection ascertained and the authors are sceptical of the rodent origin of the disease. Over 20 000 rodents have been examined in Cochin China and many thousands of cultures made from them—only one strain of *Pf. whitmorei* has been isolated. Unlike plague the disease is more prevalent in Europeans than in the indigenous population who are in closer contact with rats. The organism has once been isolated, along with *P. pyocyanea* from the blood of a shaved guinea pig immersed in contaminated water. The authors discuss the possible origin of *Pf. whitmorei* considering particularly whether it might be a sudden mutant or an organism usually saprophytic and attaining virulence in debilitated persons. All of their infections arose in subjects debilitated by surgical operations or febrile illnesses, and in some the disease actually appeared after the patients had been a considerable time in hospital. The view is taken that *Pf. whitmorei* may be a virulent variant of *P. pyocyanea* to which it bears some morphological, cultural and biological resemblance (a view which has previously been expressed by a number of French workers). One worker has demonstrated that certain strains of Whitmore's bacillus produce a soluble green fluorescent pigment in synthetic medium.

This paper contains the most complete list of references on melioidosis known to the abstractor.

J. C. C. Chant

PROTOZOOLOGY: GENERAL

BROCCA E. Osservazioni sulla posizione d'istematica del *Trotoplasma*. The Place of *Trotoplasma* in Nature. *Riv. di Parassit.* Rome 1919 June v. 10 No. 2, 73-92. (246 refs.) English summary (9 lines)

More than 40 years ago Nicolle and Manrooux described a protozoon in a rodent in North Africa and named it *T. plasma gondi*. Others remarked on its likeness to *Leishmania* others again to *Encephalitozoon*. Cases of human infection have been reported by Castellani in Ceylon but Wenyon has cast doubt on these. In short there seems to have been a certain degree of confusion between *T. plasma*, *Encephalitozoon*, *Sarcoplasma* and *Sarcosporidia* and the place of *T. plasma* in nature is yet to be determined.

From a consideration of this vexed subject the author concludes: 1. that *T. plasma* if it is to be regarded as a protozoon has simple morphology (as described in the textbooks) is non-motile but endowed with gentle writhing motion (scintillamento) capable of infecting many vertebrates penetrating and multiplying in the tissues. 2. It differs from *Rhizopoda*, *Flagellata*, *Ciliata* and *Sporozoa*. 3. the reputed species *T. canis*, *T. felis*, *T. muris*, *T. hominis* etc. merely indicate that *T. plasma gondi* has been found in different hosts and that there is only one valid species. 4. the genera *Encephalitozoon* and *Sarcoplasma* have no characters sufficiently different to separate them from *Trotoplasma* and therefore 4. one cannot accept the species of *Encephalitozoon* e.g. *E. cuniculi*, *E. brevis*, *E. felis* etc. and *T. plasma* and *Sarcosporidia* are only differentiable morphologically and biochemically though they have certain characteristics in common. H. H. Goldie

ENTOMOLOGY AND INSECTICIDES GENERAL

See also p. 978. COMMONWEALTH INSTITUTE OF ENTOMOLOGY. Report of the Fifth Commonwealth Entomological Conference.

PICAUD A. Observations sur la repartition des gîtes larvaires de moustiques sur le territoire d'une ville de la banlieue parisienne Saint-Maur-des-Fossés (Seine) en 1948. [Observations on the Distribution of Mosquito Breeding Places in the Town of St. Maur-des-Fossés (Seine) on the Outskirts of Paris in 1948. *Rec. Trav. Inst. Nat. Hyg. Paris*, 1949 Tome 3 v. 3 871-8, 1 fig.

— Expériences relatives à la possibilité d'un contrôle du pullulement des larves de moustique (*Culex*) dans les égouts d'une ville de banlieue (St. de Saint-Maur-des-Fossés Seine) [Experiments in the Control of Mosquito Larvae (*Culex*) breeding in the Street Sewers of a Suburban Town (St.-Maur-des-Fossés, Seine)] *Ibid.* 879-91 5 figs.

These papers are concerned with the control of house-haunting *Culex* in St. Maur-des-Fossés on the outskirts of Paris. Little or no breeding was observed in pools, ponds, marshes, cesspits, lakes, waterways, nor in boats anchored in the river. But extensive breeding occurred in the precipitation chambers at different points of the street sewer system. This type of chamber is common in Paris and in provincial towns. In summer larvae and pupae occur in large numbers in these chambers; adults are found on their walls and also in houses. In winter only a few aquatic stages remain in the chambers and the adult females are found hibernating in large numbers in cellars, caves and stables.

The author discusses the difficulty of treating these breeding places with insecticide. The chambers are subject to recurring vigorous water flow; they often contain a great amount of debris of all sorts from the streets and spider webs are commonly plentiful. Periodic dusting and spraying was consequently found to be unsatisfactory. Complete control was obtained, however, by depositing a small block of plaster impregnated with 50 cc. of a 5 per cent DDT solution in keroline in each precipitation chamber. Four treatments in this way between May and September are proposed; a probably adequate to control the mosquito during its active breeding season.

Culex pipiens larvae were found during a survey of ponds and ornamental lakes in the town but no specific identification given of the *Culex* breeding in the precipitation chambers. D. S. Bertram

KING W. A. & HOOCHSTRAL H. Species of *Ides* (Family of the paper "Group in the Australasian Region (Diptera, Callitidae). *Proc. Entom. Soc. of Australia*, 1946 48 v. 4 134-57 3 figs.

CARTER H. F. & A. J. SIMPSON J. Observations on Sandflies (*Phlebotomus*) in Delft Island, North Ceylon. (*Trop. Med. & Parasit.* 1949 Apr v. 43 No. 1 62-73 2 figs. & 1 map.

Two visits were made to Delft Island (Ceylon) one from July 22nd to August 19th, 1947 during the dry season and the second from January 9th to 31st 1948, at the end of the wet season.

Collections of adult *Phlebotomus* were made both indoors and outdoors in different parts of the island and by the use of land at baited traps, light traps, oiled paper traps or by spraying indoors with pyrethrum spray and collecting the sandflies from a white sheet laid over the floor. No possible breeding places was examined by Stot in detail. 1

The following species were taken *Phlebotomus argentipes* (3,227 ♀, 853 ♂), *P. antennatus* (27 ♀, 45 ♂) *P. babu* (?) (9 ♀, 4 ♂), and 1 ♀ and 6 ♂ of uncertain identity. *P. antennatus* had not previously been recorded from Ceylon and *P. zeylandicus*, common in parts of the main island of Ceylon, was not found on Delft Island.

P. argentipes, the predominant species, was more abundant in January than during July and August. They occurred in about the same densities during January in stone-and-mud houses and in those built of coconut palm leaves but they were more common in the stone-and-mud houses in the dry season (July–August). Males usually formed less than about 23 per cent of the catches but in two instances much higher percentages (68 and 75.5 per cent) of males were taken. Females, engorged apparently with blood, were caught during both the dry and wet seasons, but those with ripe ovaries were more numerous in the wet season.

Of 148 possible breeding places of *Phlebotomus* examined 19 were positive for immature stages of the fly. The positive sites were crevices in the floors and plinths of houses, the soil at the edges of refuse heaps and at the base of stone walls. In January, 18 out of 110 sites contained larvae, larval skins, or pupal cases and of the 38 sites examined during July and August only one, containing one pupa, was positive.

Breeding appears to be restricted in the dry season (July and August).

Captive females of *P. argentipes* deposited 95 eggs in the laboratory, the larvae which hatched from these eggs were bred out in moist soil and crushed guano and faeces and 15 ♀♀ and 10 ♂♂ were obtained 28–35 days after the original oviposition. The temperature of the laboratory varied from 25° to 28°C and the relative humidity from an afternoon mean of 66.6 per cent to a morning mean of 74.4 per cent. The temperature of the breeding medium at one inch below the surface was consistently 30°C.

D S Bertram

LUSCHER, M. Continuous Observation of Termites in Laboratory Cultures. *Acta Tropica* Basle 1949, v 6, No 2, 161–5, 2 figs

The author describes a technique which he has employed successfully for maintaining colonies of termites in captivity and under conditions in which constant observations can be made.

One wall of the nest consists of a clean photographic plate (12×9 cm). The other wall is made in sections with ordinary microscopic slides, the slides being separated from the plate by narrow glass slips arranged to form the sides, bottom and top of the nest. The thickness of the glass slips is only sufficient to give the termites room to move freely between the plate and the slides. The space allowed varies with the species of termite but it is between 1.5 and 4 mm. The lower quarter of the nest is partly cut off from the rest of the chamber by two transversely arranged glass slips. These, however, do not meet in the centre, thus leaving a communicating gap between the upper and lower compartments. The lower chamber contains damp cotton wool. Glass wool plugged into the central gap draws up the water and maintains a high humidity in the nest proper. The termites, together with fine clean sand and selected wood, are accommodated in the upper compartment. All junctions of the glass slips, the plate and the slides are sealed with wax except at one point where a small crack is left open for aeration.

Nests of *Calotermes flavicollis*, *Reticulitermes lucifugus*, *R. hesperus* and *Zootermopsis angusticollis* have been maintained in a healthy reproductive state for up to fourteen months.

Replenishment of the water in the wool is necessary every four to six weeks. This is accomplished by removing the slide overlying the wool. As the slides

covering the nest become obscured by accumulating debris and Larces they are removed and replaced by new slides.

Apart from observations on the termite castes and so on, these nests have been useful for extensive tests on the resistance of different woods to termite attacks.

D. S. Bartram

SAUTET J LEVASSSEUR G VUILLET J ARNOUX R. Possibilités d'action directe et indirecte des ultrasons dans la lutte antilarvaire contre le paludisme la fièvre jaune et la dengue. Première partie Action biologique des ultra-sons sur les culcides (SAUTET LEVASSSEUR & VUILLET). [The Possibilities of controlling Malaria, Yellow Fever and Dengue by the Direct and Indirect Action of Supersonic Waves on Mosquito Larvae.] *Rec Travaut Inst Nat Hyg Paris* 1949 Tome 3 v 3, 997-1020 17 charts & 3 figs. Deuxième partie Action des suspensions le DDT et autres corps traités par les ultra-sons (SAUTET ARNOUX LEVASSSEUR & VUILLET). [The Action of Suspensions of DDT and other Substances Irradiated by Supersonic Waves.] *Ibid* 1021-8.

In the first paper the authors have investigated the effectiveness of super-sonic waves for the destruction of the eggs, larvae and pupae of some culicine mosquitoes and of *Anopheles maculipennis*. Under experimental conditions in which the impact of the waves on the organism is ensured for the whole of the exposure period death may follow immediately or after a period of a few hours. Immediate deaths are caused in late larval stages by excystation whereas in the young stages the tissues of the larvae are disintegrated. Eggs are ruptured by effective treatments. Some eggs which survived treatment gave rise to larvae which developed more rapidly than control larvae. Exposures to 1,200 mA for two seconds or to about 300-400 mA for thirty seconds are effective but this effectiveness varies somewhat with the stage and the species of mosquito.

In experiments in which the waves were not evenly reflected throughout small breeding dishes of about one litre capacity some larvae died immediately but others survived for up to seven days even after 10-15 minutes exposure of the water to 1,200 mA.

Moultine, pupation and the emergence of adults follow after inadequate treatments.

There is little indication that the type of apparatus employed (this is described and figured) is likely to be of practical value for the control of mosquitoes under field conditions.

The second paper deals with a few small experiments on the effectiveness of DDT, pyrethrum and hexachlorocyclohexane (benzene hexachloride) against culicine larvae. Only five larvae were used in each experiment. Irradiation with supersonic waves is an added factor in some of the tests but it is not in the reviewer's opinion, clearly shown that this materially improves the action of the insecticides.

D. S. Bartram

LABORATORY PROCEDURES

COUDERT J & JUTTA P. A propos des methodes d'enrichissement des milieux. On Methods of Enrichment of the Stocks. *Bull Soc Path Exot* 1949 v 42, No. 34 111-14.

The authors find that direct examination of the stools is often insufficient and that some enrichment method is necessary. The essential conditions for such method are that —

- (1) A large number of parasites should be concentrated in the least possible volume ,
- (2) the maximum amount of inert matter should be eliminated ,
- (3) the morphology of the cysts and ova should be maintained

Several methods in common use are discussed. The method of CARLE and BARTHÉLÉMY (1913) takes too long and entails the use of two reagents. Further, the formalin alters the shape of cysts. The method of YORK and BIDEGARRY gives good results but has the same disadvantage of being long and in addition requires a 30 per cent solution of saccharose, a material difficult to obtain at present.

The method of TELEMANN modified by Garin eliminates some of the disadvantages of the former of the above methods. The technique that the authors suggest is a modification of this method. It is as follows —

A "walnut" of faeces is added to 100 ml of water. The solid matter is pulverized with an agitator and a fine emulsion obtained. The material is allowed to settle for one minute. In an ordinary centrifuge tube are placed 5 to 6 ml from the superficial layer of the emulsion and 1 ml of hydrochloric acid is added. The whole is shaken. 2 or 3 drops of toluene are added and the preparation is again shaken vigorously. The tube is filled with ether. The whole is shaken and centrifuged slowly for 3 or 4 minutes.

The sediment is examined between a slide and coverslip.

The order in which the materials are added is important.

The method has been used for 6 months in the *Laboratoire de Parasitologie de Lyon* and over 500 stools have been examined. It was found very satisfactory even in the examination of icteric stools which usually present difficulties.

L E Napier

PICK, F. Nouveaux dispositifs pour la technique de la coproculture [New Methods of Coproculture] *Acta Tropica* Basle 1948, v 5, No 4, 354-7, 4 figs.

Pick describes and illustrates some new methods of recovering nematode larvae from faecal cultures. These are modifications based on the principle involved either in the Baermann technique or on the Petri dish technique and as they require a minimum of laboratory apparatus are useful in routine examinations. The illustrations should be seen in the original.

J J C Buckley

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE Colonial Research 1948-49 Reports of the Colonial Research Council, Colonial Products Research Council, Colonial Social Science Research Council, Colonial Medical Research Committee, Committee for Colonial Agricultural, Animal Health and Forestry Research, Colonial Insecticides Committee, Colonial Economic Research Committee. Cmd 7739 134 pp 1949 London H M Stationery Office [2s]

This Report comprises 7 sections, each an annual report (1948-49). The bodies represented are Colonial Research Council, Colonial Products Research Council, Colonial Social Science Research Council, Colonial Medical Research Committee, Committee for Colonial Agricultural, Animal Health and Forestry Research, Colonial Insecticides Committee, Colonial Economic Research Committee. Of these, the reports of the Colonial Medical Research

Committee and the Colonial Insecticides Committee will be of most interest to readers of this *Bulletin*.

The list of schemes approved in the financial year 1948-49 for grants under the Colonial Development and Welfare Acts is most impressive. The sum covered in this list is £1,852,169 and the allocations made since the inception of the organization after the first Act of 1940 have reached the figure of £5,913,708. The actual issues in relation to the research schemes (many of which are planned to extend over several years) are of course much less, £1,579,418 but the money for the remainder is available and in due course the work which it represents will be accomplished. Medical research is well represented in this list but no individual item commands the big sum given to certain projects of fishery research and of agriculture and forestry research. Nevertheless there are many medical projects of considerable size and very varied interest.

The East African Medical Survey, now begun in Tanganyika Territory should provide useful information on the vital statistics and common diseases of the Africans living under rural conditions, provided that it is carefully carried out for a long period. Some readers will remember the survey conducted in the Bahama district 20 years ago by Dr A. R. Lester which was abandoned when it became evident that the outbreak of trypanosomiasis was interfering grossly with the Africans and their cattle. It is to be hoped that this history will not be repeated.

The virus research laboratories in Uganda and Nigeria are to be taken over completely from the Rockefeller Foundation (which has partly financed them) in the near future and the laboratory at Freetown will be taken over from the Liverpool School of Tropical Medicine. The staffing of these laboratories has presented difficulties but when these are surmounted there should be opportunities for much fundamental research. Apart from these there were several projects in being: the Nutrition Research Station in the Gambia, where improved methods of farming are being tried; research on malaria in North Borneo, Malaya and East Africa, on scrub typhus in Malaya, relapsing fever in Kenya and on physiology in Uganda and Nigeria. The Report itself is much more than a catalogue of these efforts, in that it gives considerable detail of some of the work. For instance the recommendations on dosage of proguanil (paludrine) made by the team working on a West African strain of *P. falciparum* at Horton are given in full and there is much detail of the results obtained in the treatment of schistosomiasis with Surcil D and of scrub typhus and typhoid fever with chloromycetin. Similarly the investigations into transmission of yellow fever in Uganda and scrub typhus in Malaya are summed up (so far they have gone) in such a manner that an administrative officer could obtain a reasonable grasp of the subjects. These accounts add very greatly to the interest and value of the Report.

The Report of the Colonial Insecticides Committee is equally interesting, reference being made to the mosquito eradication experiment in Cyprus and Mauritius, to the various malaria experiments and to the work being done against tsetse and other flies. Some of the work of this Committee and of the Colonial Insecticide Research Unit, Uganda, concerned with agricultural problems.

Charles Wilcock

COMMUNALITH I THITE F I (OMI) S Report of the Fifth Commonwealth Entomological Conference 22nd-30th July 1948. pp. - 112. 1949. Dnc London 41 Queen G 1 W 7 7 8J

Forty-six delegates and official observers attended the Fifth Commonwealth Entomological Conference held from the 22nd to the 30th July 1948 in London.

Micro-organisms, 38 Old Queen Street Westminster London, S.W. 1 and the "Catalogues" are available free on request from the Director Laboratory Animals Bureau, Royal Veterinary College Royal College Street London, N.W. 1

It is recognized that the particulars so far collected are probably incomplete and institutes which are maintaining cultures and are willing to co-operate are asked to send details of their collections to the appropriate address for inclusion in future lists.

R. L. Sheppard

[INDIA. Annual Report of the Public Health Commissioner with the Government of India for 1946. MEHTA, J. N. Director General of Health Services, Govt. of India] 117 pp., 1 folding map, 1948. Delhi: Manager of Publications. Rs 2 12 or 4 (6d)

This Report dated November 1947 is signed by Dr Jivraj N. Mehta, who was the first Director General of Health Services of the new Government of India established in August 1947. It closely resembles the report for 1945 except that the Arms of the new Government on the cover replace the Royal Arms.

The only statistical table that is provided deals with the birth death and infant-mortality rates of the parts of India still described as British India. These statistics have always been regarded as quite untrustworthy for most of the Provinces and in view of the disturbed conditions prevailing in 1946 they are not likely to be any more reliable than formerly. Startling variations occur in the figures for different Provinces—for example the birth rate is shown as 18.0 in Sind and 37.7 in the adjoining Province Punjab—the death rate is shown as 8.7 in Sind and 28.9 in Central Provinces. For what they are worth the figures suggest that the birth rate has risen appreciably from the low rates recorded during the years 1941-1945.

In the body of the Report figures are given for three rural areas in which experimental Health Units have been working for several years. These figures are likely to be fairly reliable because the reporting agent have been under supervision of the staffs of the Units, and although they deal with small samples of the population—about 50,000 each—they are significant in showing what has happened in typical areas provided with modest health organization. If similar results were to follow the establishment of such Units throughout India the rate of growth of population would be greatly accelerated.

	Birth Rate		Death Rate		Infant-Mortality	
	1949	1945	1946	1945	1946	1945
British India	28.4	27.3	18.4	1.5	125.8	150
Najafgarh Health Unit (Delhi Province)	45.7	48.6	1.5	4.0	116.7	151.7
Singur Health Unit (Bengal Province)	47.5		16.5		120.2	
Puranasalle Health Unit (Madra Province)	34.3	22	1.9	2.5	162	10.8

The only reference to the population problem in the present Report is the following statement by Dr Mehta in his introductory remark: "During recent years India has gradually drifted into a position of overpopulation. The pressure of the increased population on the land is only one of the factors involved in such a situation."

This statement should be read in conjunction with remarks contained in the section on Nutrition from which it appears that food is still a major problem for 170 millions of the people and that the daily adult ration provided barely 1,200 calories—possibly the lowest intake of rationed food in the world. The total production of cereals in India is said to be 4,000,000 tons, only the

quantity needed being about 8,000,000 tons, the shortage was partly made up by importing 2,000,000 tons "and this was all that was available."

These statements suggest that to maintain the people of India in a moderate state of nutrition the food supply would have to be twice as great as the amount actually being produced in India, and that even if this huge increase could be made available a further progressive increase would be needed for the rapidly growing population

The most authoritative pronouncement on this appalling problem has been made by the Health Survey and Development Committee in their Report, dated 1946 [which was reviewed at length in this *Bulletin*, 1947, v 44, 252]

This problem of population and food supply is by far the greatest of all public health problems not only for India but also for most of the countries of the world. Competent experts have estimated that one-half of the world population are suffering from severe malnutrition and that one-half of the rest are undernourished

Public health workers everywhere, except in a few progressive countries are faced with a situation in which their efforts to improve health conditions, must inevitably fail unless a suitable balance can be established between the number of mouths to be fed and the food that is available. A tragic feature of the situation is that the more lives are saved by the control of infectious diseases the sooner will the food-supply position become acute

It may be argued that population control and food production are not subjects for which health organizations are responsible, but although this is technically true it would be a suicidal policy to remain silent and inactive spectators of the process of undermining the very foundations of the public health structure

What can be done is to make the problem a subject of study in every public-health curriculum and to organize a concerted effort to arouse both governments and peoples to a sense of the gravity of the situation and of the need for action to avert disaster

No apology is needed for calling special attention to the above problem, the rest of the Report is relatively unimportant, it deals chiefly with the incidence of the great infectious diseases, none of which was unusually prevalent in 1946

Cholera was less severe than in 1945, though some readers may be surprised by the statement that in Bengal "the incidence of the disease was even milder this year" when they go on to read that there were 27,710 deaths. Cholera inoculation was extensively carried out, in Bengal nearly 8,000,000 persons were inoculated

Plague was epidemic in some parts of the United Provinces where there were 18,199 deaths, also in Bombay, Bihar and Madras

Malaria was severe in Bihar, but not in any other province. Plans were made during the year for controlling the disease by DDT and paludrine [Proguanil]

Tuberculosis received special attention, reference is made to proposals to employ BCG vaccine as a control measure

Leprosy treatment and control on comprehensive lines was being planned in Bengal

Kala azar was not specially prevalent in any province, the only figures given are for Assam where 22,000 patients were treated

At a Conference of the Provincial Ministers of Health the recommendations of the Health Survey and Development Committee were accepted in principle as "objectives to be kept in view," but the programme for the first five years was regarded as "not within present financial resources"

A brief summary is given of the valuable research work carried out during the year—the chief subjects were malaria, nutrition, cholera, plague and leprosy.

The activities of the voluntary health organizations are described—these include the Red Cross and St. John Ambulance organizations, the Tuberculosis Association of India, the British Empire Leprosy Relief Association (India Council) and various provincial Maternity and Child Welfare Associations.

John H. D. Vargas

LOURENÇO MARQUES MOZAMBIQUE. Missão de combate as tripanosomíases. Relatório anual de 1947 (Mission for combating Trypanosomiasis. Annual Report for 1947) 132 pp. 11 maps, 3 graphs & 1 plan. [10 refs.] 1948.

The Mission was appointed in 1945 and its field of action is practically the whole Colony of Mozambique—the construction of the hospitals, dwelling houses and other works is expected to be completed by June 1949. The Chief of the Mission, Dr. Mário Augusto de Andrade e Silva, succeeded his predecessor Dr. Jacinto de Sousa on 1st April 1947. The Staff consists of 45 Europeans and 103 Africans—the former include 11 medical officers, 5 veterinary surgeons, a botanist and an entomological staff of 14 under the direction of Mr. H. E. Hornby, formerly the Director of Veterinary Services in Tanganyika Territory. The expenditure during 1947 was 6,228 600 escudos (about £67,000 at 100 escudos=£1).

The regions of the Colony where the Mission worked were divided into 9 medical sectors and 4 veterinary sectors—the former are all north of the Beira Mashonaland railway—5 being in Niassa province and 4 in the province of Manica and Sofala which borders on Northern and Southern Rhodesia. The 4 veterinary sectors occupy the whole of the southern part of the Colony from the Natal boundary to the Zambesi river—on the west they border on Swaziland, the Transvaal (the Kruger National Park) and Southern Rhodesia.

Inspection.—During the year Dr. de Andrade e Silva toured the Colony with Dr. F. Pires, the chief veterinary officer of the Mission or with Mr. Hornby or with both and inspected most of the sectors—a short description of these journeys is given.

Tsetse fly surveys.—The distribution of the 4 species of tsetse fly—*Glossina morsitans*, *G. pallidipes*, *G. brevipalpis* and *G. austeni*—found in the Colony is shown on several coloured maps, and brief notes of the position in the various districts are given in the text. *G. morsitans* infests most of the area from the River Rovuma (the northern boundary with Tanganyika Territory) to about 40 miles south of the River Save. *G. pallidipes* is widely spread in the provinces of Niassa and of Manica and Sofala. *G. brevipalpis* and *G. austeni* are shown in the eastern part of the *G. morsitans* area and also in the Maputo river region south of Lourenço Marques. In November 1946 Hornby surveyed the western part (Alto Limpopo) of the country between the Save and Limpopo rivers and concluded that, owing to the climatic conditions, the kind of vegetation, and the distribution of the game animals *G. morsitans* could not subside in this area (see this Bulletin 1948: 45: 584). His findings were confirmed by an aerial survey made by the botanist, the assistant entomologist and Dr. Pires in November 1947. Other surveys by Hornby included one of the east coast south of the River Save where conditions are suitable for tsetse flies, especially *G. morsitans* and *G. pallidipes* were found—preventive measures will be taken in this area (Goruro) in 1948. Another survey was in the Maputo district between Lourenço Marques and the Natal boundary—see this Bulletin 1948: 45: 1068.

Sleeping sickness—This is practically confined to the two provinces of Niassa and Manica and Sofala and nearly all the cases in the latter province occurred in the Tete district. There were 253 cases (4 in Europeans), 197 in Niassa province and 56 in the Tete district, an increase of 101 on the number (152) in 1946. The incidence was 1.2 and 0.7 per 1,000 of the population respectively and the highest local incidence was 4.3 per 1,000 in Moçimba da Praia in the extreme north. The population is mostly scattered in the bush in small groups of one or two families, which is unfavourable to the occurrence of epidemics, and the chief cause of the increase of the disease is the movement of people due to the great increase in agricultural and industrial labour. There are 8 hospitals and 13 (later 26) observation posts. Patients are treated with antrypol and tryparsamide. The usual prophylactic measures of mass examination of people, bush clearing, disinfection of vehicles and travellers on roads, were taken and 1869 prophylactic injections of antrypol were given.

Animal trypanosomiasis—The veterinary sectors were determined by the need to protect cattle from nagana in some parts and by the importance of other areas for animal husbandry. It was necessary to protect the Sul do Save province (south of the Save river) as it has the best conditions for the cattle industry and is the least infested by tsetse flies. Sector 1 (H Q Maputo) has splendid resources for cattle breeding, in Sector 2 (H Q Mambone at the mouth of the River Save) the right bank of the River Save and the area of Govuro must be kept under observation in regard to *G. morsitans*, Sector 3 (H Q Espungabera on the Southern Rhodesian boundary opposite Melsetter) between the Rivers Save and Lucite, is heavily infested with tsetse flies but has agricultural importance, and in Sector 4 (H Q Vila Pery on the Beira-Mashonaland railway) the largest European settlement in the Colony is established and a high proportion of the cattle are infected with nagana.

The nagana problem is very serious and is the greatest obstacle to the future economic and social development of the Colony, nearly two-thirds of the Colony is infested with tsetse flies and nagana occurs also in some parts where no tsetse flies have been found, and it is thought that mechanical transmission may be important. There are about 600,000 head of cattle of which 450,000 live south of the River Save, 100,000 in Manica and Sofala, 30,000 in Zambesi province and about 4,500 in Niassa province. The corresponding approximate figures for sheep are 30,000, 20,000, 4,500 and 4,000, for goats 75,000, 90,000, 9,000 and 90,000, and for pigs 20,000, 28,000, 4,500 and 4,500. These are shown on a graph. In the province of Sul do Save very few cattle belong to Europeans, from lack of interest, but this area is very favourable for animal husbandry. Except in the provinces of Sul do Save and Manica and Sofala (Angónia) the Africans do not keep cattle. Most of the cattle in the provinces of Zambesi and Niassa belong to large agricultural companies and in spite of periodic treatment of infected animals these companies have to import cattle to make up their losses.

The commonest species of trypanosome in cattle, sheep and goats is *T. vivax*, next comes *T. congolense*, then mixed *T. vivax* and *T. congolense*, while no *T. brucei* were found in 31,888 animals examined. *T. simae* was found in 5 pigs.

The Maputo region is very important, it has an equable climate, rich pasturage, fertile soil, and the valleys have abundant water for irrigation. It has been reported on by the veterinary officer of the Mission and by Mr Hornby [this *Bulletin*, 1948, v 45, 1068]. The only tsetse flies found are *G. brevipalpis*, near the River Maputo, which feeds chiefly on hippotomus, cattle and small antelopes, and *G. austeni*, near the Libombos to the west where game is abundant. The right bank of the Maputo river is a reserve of elephants of which there are over 2,000, there are also 6,000 head of cattle in this reserve.

and these should be kept separate from the game by a strong sisal hedge. In 1948 the Mission will try the effect on *G. brevipalpis* of applying DDT and gammexane to the cattle. The phenanthridinium compound M & B 1553 was given to 489 head of cattle and a month later hardly any showed *T. congolensis* and all increased in weight. A list of other biting flies and ticks is given.

In the Govuro region near the River Save where there is a high rate of infection, the cattle of the Europeans were treated with dimidium bromide a phenanthridinium compound and in 1948 the Mission will treat all the native cattle with this drug. In Machanga on the left bank of the Save most of the cattle belong to the Africans and are in poor condition and short of grazing areas. In the Chumoso region the Europeans are chiefly interested in cattle for work on their farms in 1945 there were 13 432 cattle all imported from the Tete region they are underfed and overworked and about 80 per cent. suffer from nagana. No tsetse flies have been found in the area but in 1948 a survey with Harris traps and animals as bait will be made. The Munda region is important from its nearness to Beira the plains near the River Pungwe 60 km. from Beira, could support some thousands of cattle. Repeated searches failed to find tsetse flies until Dr Pires found *G. morsitans* in June 1947. Anti-tsetse measures would be relatively easy and cheap. The region is very important for the future development of Beira. The Mossurize area has conditions very favourable for European agriculturists the present African population is too small and the position should be reviewed. It is near the progressive district of Mbezi in Southern Rhodesia. The tsetse situation here is very serious. In the Tete region the periodical bad condition of the cattle is largely due to the shortage of water and pasture owing to over-concentration of the cattle near the permanent rivers. Tsetse flies cannot establish themselves here but occasional contact is possible. The Zôboi region, near Tete and contiguous with Nyasaland, has exceptionally good conditions for agriculture and animal husbandry its average altitude is 900 metres, its climate is agreeable the soil is fertile and water is abundant. This area and the adjoining one of Angónia should supply the neighbouring coal mines of Moatze and future local industries with agricultural products.

The author advises that priority should be given to those regions with the most urgent need or which have the greatest economic importance—Maputo Govuro Munda and Tete.

Tsetse control—Maputo region Hornby studied the breeding ground and resting places of *G. brevipalpis* and began an experiment in control based on clearing. A tractor cleared one hectare (about $\frac{1}{4}$ acres) per hour which is about equal to the work of 200 labourers the cost was 435 80 x/s 10/1 not counting European supervision. The results of searches for flies and pupae during the next half year or more showed that it is possible and economical to control *G. brevipalpis* in Maputo either by settlements protected by peripheral clearings or by discriminative clearing.

Mutuali region, in Niassa province The Centre for the Scientific Investigation of the Cotton-tree needed protection from sleeping sickness for the workers clearing hunting of game traffic control and resettlement (that is sleeping sickness foci were carried out measures which are described in some detail. The results were good and the development of the area should be continued.

The game problem—The Colony has enormous numbers of wild animals including many thousands of elephants and buffaloes which have recently greatly multiplied. The author discusses the question thoroughly. Much damage to farms is done game is a reservoir not only of trypanosome diseases but also of several other fatal diseases of domestic animals but there are strong reasons for preserving it. The interest of the people should be

paramount and game should be killed in regions with agriculture and cattle, but should be protected in reserves and national parks where economic development is not interfered with. A fresh-water fish industry should be developed as a valuable source of protein food.

The Report is an interesting record of much valuable work. The coloured maps are most helpful to the reader. J. F. Corson

GALLIARD. Considerations sur la parasitologie [Reflections on Parasitology.]
Reu. Paludisme et Méd. Trop. 1949, June 15 v. 7, No 61, 154-63

This is an abbreviated account of the lecture that the author gave to the Faculty of Medicine of Paris on his inauguration to the chair occupied for 30 years by his famous predecessor E. Brumpt. It is a review of the modern trends of the subject, coloured by the rather special outlook of the Paris School. He first shows how inaccurate is the idea that morphology has had its day, illustrating this by the example of the importance of minute sub-divisions of anopheline species in malariology, where on a number of occasions these details have provided the final clue to a problem. He is not a rigid systematist, however: e.g. he fully recognizes the importance in medical practice of different strains of the species of plasmodium, filaria and other helminths and is willing to relax the laws of nomenclature in order to define these strains by special names. Much of the lecture was devoted to problems of immunity, the divergent ideas on this subject were shown to be due to various causes: e.g. the existence in different regions of biotypes showing different degrees of adaptation, the rôle of nutrition, etc. Chemotherapy has made immense strides, although it has often had a special difficulty to overcome—namely, the inaccessibility of the parasite to the drug, whether an adult filarial worm or an exo-erythrocytic schizont. In the preventive field, DDT offers immense possibilities, it is stated that after its use in Italy there was not a single death from malaria in 1948, the first year without such a death for 23 centuries.

Throughout his paper wherein the author modestly refrains from any mention of his own not inconsiderable contributions, he emphasizes the importance of the parasitized person rather than the disease itself.

P. C. C. Garnham

REFED, J. G. General Report on the Health of the Estates of the District [Batang Padang, Perak, Malaya] for 1946, 1947 and 1948. 11 mimeographed pp. 1949, Mar. Sungkai, Malaya.

This report on the health of a group of estates in the Batang Padang District of Malaya for the years 1946, 1947 and 1948 is of interest as a glimpse of changing conditions in the health of labour forces. The total population was 9,615, of whom 6,836 were Indians, the vital statistics referring to this last group since the war the births have increased greatly from a previous normal of about 38 per 1,000 to 61.3 in 1947 and 52.4 in 1948. The death rate has shown a steady decline since the war to 5.3 but in the absence of any figures on the age situation of the population this is difficult to interpret. The infant mortality rate has fallen to a low record of 87 per 1,000 live births. In common with the rest of Malaya, malaria has shown a marked steady decrease, the spleen rate in children falling in three years from 35.3 to 4.3 per cent. The explanation for this is not clear, it does not appear to be due to the use of suppressive drugs and the arguments in favour of increased immunity are weak, it would appear to be associated more with changing cultivation practices. On the other hand the nutritional state has not improved and the author considers that the root cause of sub-nutrition is certainly not solely economic as little improvement in the nutritional state accompanies improvement in the economic state. Education in feeding habits seems necessary. Anaemia

is markedly increasing and is becoming one of the most important causes of sickness and inefficiency particularly among women. The report is accompanied by nine tables of statistics.

G. Macdonald

PÉREZ GARCÍA, R. Comentarios sobre la labor realizada por el Laboratorio Clínico del Distrito La Salina durante el lapso 1938-1947 [Analysis of Ten Years Work at the Clinical Laboratory La Salina, (Venezuela)] *Bol. Med. Caracas*. 1949 Jan., v 1 No. 2, 161-81 1 graph. English summary

This is a condensed account of the work carried out at the clinical laboratory of the Creole Petroleum Corporation's Medical Department at La Salina, Venezuela during the decade 1938-1947. The district concerned lies north-west of Lake Maracaibo. The employees and their families comprise "1474 persons. During the period 24,834 faecal examinations have been made and it is stated that intestinal parasitosis is present in 8 out of every 10. The commonest 37.8 per cent., is *Trichomonas hominis* and next in order *Entamoeba coli* (37 per cent.), *Ascaris lumbricoides* (71.8) *Trichuris trichiura* (18.3) *Chilomastix mesnili* (15.3) *Giardia lamblia* (11.3) *E. histolytica* (4.5) and its cysts (4.3). Of 1,365 schoolchildren examined, 89.4 per cent were harbouring parasites and 36.6 per cent had more than one the commonest being *Ascaris*. Cysts of *E. histolytica* were found in 8 out of 100 cockroaches (*Blattella americana*) examined and in 2 of the same number of flies (*Musca domestica*). Malaria is rife but much less in the last four years, the morbidity per mille in the 5 years 1943-47 being 53.3, 29.9, 14.5, 14.1 and 7.9 respectively. The infection in 86.6 per cent is by *P. vivax*. Typhoid fever is not common, but the number of cases, which in 1944 to 1946 were 6, 5 and 4 respectively rose to 11 in 1947. All the proved cases occurred in parts outside the sanitised sites." Syphilis which had been high, 73.4 per mille in 1943 fell to 43 in 1944 and in each of the next 3 years has been round 17 per mille. Mears of urethral discharge examined for gonococci numbered 4,800 and positive cases have tended to increase during the last 4 years but the examination is limited to direct examination of stained smears.

H. Harold Scott

BOOK REVIEWS

SCHÖNRODER Fritz et al. *Chemotherapy. Flat Review of German Science 1939-1948*. 704 pp. 6 figs. 1948. Published by Office of Military Government for Germany. Field Information Agencies Technical British French U.S.

This account of chemotherapeutic research in Germany during the war years is produced by the FIAT branch (Field Information Agencies Technical) of the Military Government of the British, French and U.S. Occupation Zones in Germany. It is a more polished production than the hastily prepared BIOS (British Intelligence Objectives Sub-Committee) report which served such a useful purpose a few years ago by giving the widest possible publicity to available information on German scientific progress during the war. Unlike the latter production the present one is a printed compact booklet, written not by the interviewing teams who visited Germany immediately after the war but by the German scientists themselves. The senior author is Fritz SCHÖNRODER and there are many other well-known names such as those of DOMAG, HARTH, MÜLLER and M. C. among the 19 contributors.

Although the title page, the foreword (by the Chiefs of the three FIAT services), and the table of contents appear in English, the entire remainder of the volume is in German. It is in the form of 23 self-contained articles, well documented and with useful bibliographies. Where necessary, suitable reference is made to work carried out before the war leading up to particular developments described. There is an adequate author- and subject-index to the volume as a whole. The production is worthy of wider circulation than appears possible as yet, and we learn in the foreword that "The manuscript from which this volume has been derived has been turned over to a committee of German scientists which will make the arrangements necessary for printing other than this strictly limited edition. The latter is transmitted by the respective FIATs to their Government for distribution."

In his introductory note, SCHÖNHÖFER emphasizes the importance of close liaison between chemists and medical men if there is to be any substantial progress in the field of chemotherapy. And yet the element of chance continues to play a big rôle in the emergence of commercially successful preparations. Hardly a dozen such have arisen from the 20,000 compounds examined in 5 to 10 different types of animal test during the past 35 years in the Chemotherapeutic Laboratories of the *I G-Farbenindustrie* at Elberfeld.

The individual contributions are uneven in length and scope, but none is without some interest. The longest is a comprehensive account in 52 pages by PRIGGE of the experimental chemotherapy of tuberculosis and the biochemistry of the bacillus. Tuberculosis is also covered at some length, together with leprosy, in a contribution by WAGNER-JAUREGG. Then there are quite short articles, as for example a paper in 4 pages by KIKUTH on the sulphonamide treatment of virus infections, in which special reference is made to the suitability for laboratory investigations, of the broncho-pneumonia virus of rodents described by GONNERT.

Chemical and biological aspects of the chemotherapy of malaria are covered by 6 chapters in 56 pages. Chemical work in this field in Germany did not go far beyond exploration of quinoline and acridine derivatives, with "Sontochin" and "Endochin" among the quinolines as the best-known products. "Sontochin" was first tested in a limited way already as far back as 1937, and the story has often been told (though not in the volume under review) how a stock of this substance of unknown composition at the time, was captured in North Africa in 1943, and then carefully studied in the U.S.A., where a closely similar compound, "Chloroquine" (which is "Sontochin" minus its 3-methyl group) eventually emerged as the most highly recommended product of the U.S. war-time drive for new antimalarial agents. "Endochin", among the quinolines, is an interesting departure from the classical heterocyclic alkylaminoalkylamine type of synthetic antimalarial. It is said to have given better results than paludrine in sporozoite infections of *P. cathemerium*, though not in those of *P. gallinaceum*, but it proved to be of little or no value in human malaria.

Other chapters deal with quaternary quinoline compounds as agents against trypanosomiasis and babesiasis, 4-aminoquinolines (such as Surfen C for *T. congolense* and 7602 Ac for *T. cruzi* infections), organic bases as amoebicides, metals and metalloids in general, sulphonamides and related compounds as both antimalarial and antibacterial agents, and the xanthone drugs (the "Miracils") for bilharziasis. Interesting short chapters deal with nitrobenzoic acid esters and isomers of N-methyl acridone as antibacterial substances, and with the curious discovery that replacement of the *p* *p'* chlorine atoms of DDT by NO₂ groups converts this substance from an insecticide into a chemotherapeutic agent for experimental typhus infection.

laid down by the Government trypanosomiasis service are given in tables. Atoxyl and pentamidine are used in early cases and Orconine and Tryparsamide in late cases. It should be noted that most of the information in this chapter is only applicable to the infection caused by *T. g. sensu*.

A chapter on ophthalmology includes among many other things a detailed account of an operation for trichiasis. This may suggest that hospital assistants in the Upper Volta are accustomed to perform this operation on their own. A number of coloured drawings of common eye lesions are given. The laboratory section is too short but contains an amount of practical information useful to hospital assistants including diagrams of parasites and bacteria.

A White Sister has contributed an informative section on the care of babies and this is of special value for only too rarely have African hospital assistants any knowledge at all of the care of the young.

Dr. Goarnisson has evidently a vast experience of medical work in West Africa and his book would be of value to a teacher of African hospital assistants or dispensers or dressers in any part of tropical Africa but it is doubtful whether it is of great value to the hospital assistants themselves in its present state. A severe pruning would however render it eminently useful.

H. G. Calvert

TROPICAL DISEASES BULLETIN

Vol 46]

1949

[No 11

SUMMARY OF RECENT ABSTRACTS*

IX LEPROSY

General

A bibliography of leprosy from the year 1500 has been published by KEFFER (p 1133) A history of leprosy in Brazil has been written by DE SOUZA-ARAUJO (p 1132) This completes a great task, the first volume of which was published some time ago

A special issue of *Leprosy in India* (p 790) is devoted to the conference held at Wardha This should be read in full

DHARMENDRA (p 791) declares that leprosy legislation in most of India is out of date He outlines some of the points which should be included in future acts In the same discussion COCHRANE (p 791) makes the point that any legislation which encourages an atmosphere of dread, and drives patients into hiding, is bad It is not practicable to isolate all infective patients, and investigation is required to discover the minimum amount of segregation needed to control the disease

Epidemiology

The distribution of leprosy throughout the world is dealt with in a supplement to the *International Journal of Leprosy* (p 436)

The number of cases of leprosy in Norway has diminished from 3,000 in 1856 to 23 in 1943 (HARBITZ, p 607)

Leprosy is prevalent in the Belgian Congo and although the general incidence is probably no more than 5.5 per 1,000 of the population, DUBOIS (p 436) quotes documents to show that in some villages up to 100 per 1,000 are affected The commonest exposure is domestic For control, agricultural colonies have been instituted, largely under the care of medical missionaries, most of the patients in them have lesions of the nerves [This is a long communication which should be studied in the original]

CHAUSSINAND (p 607) has analysed 1,002 cases of leprosy in Cochin China, in relation to age and sex Three-quarters of the patients were males There were many more male than female patients in the age group 15-20, which probably reflects the greater opportunities for infection experienced by males outside their families Up to the age of 15 rather more female than male children were infected, and the female rate rose at ages 25-29 and 40-44, probably reflecting the stresses of child-bearing and the menopause

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1948 v 45 References are given under the names of the authors quoted and the pages on which the abstracts are printed

DOUGLASS *et al.* (p. 53) have carried out a detailed enquiry into the histories of 7,204 families in the Philippine Islands in relation to leprosy. The births date back to 1893. They found that infection rates in those born in 1911-23 were only one half of the rates in those born in 1893-1910 and that in families in which lepromatous leprosy had occurred the fall in incidence had been even greater than this. Compulsory segregation was introduced in 1907 and this may have been a factor but other changes also took place particularly a rise in the standard of living.

ATCOCK and GORDON (p. 186) discuss leprosy in veterans of the American forces. Most of those known to have the disease were born in the endemic areas of the United States and many had not served in endemic areas overseas. Leprosy is still endemic in Texas, but many of the patients diagnosed there were born in Mexico (JOHANSEN p. 610). MCCOY (p. 1007) discusses the few cases of leprosy in California, very few of whom were infected in that State.

FLOCH (p. 437) reports on leprosy in French Guiana, where 5.1 per cent. of the population are infected. One half of the new cases discovered are in children under 15 years, and there is a real danger of spread from infected schoolchildren to their schoolmates. Familial infection is evident and a case is quoted where a servant infected five infants. Europeans are usually only infected after long residence but they do not show the same degree of resistance to the disease as is characteristic of the local people.

RISI (p. 438) states that in the humid Amazon valley of Brazil the incidence of leprosy is high—1.0 to 3.8 per 1,000—but in the dry north-east it is 0.9 or less. Proportionately there are more severe lepromatous cases in the north-east than in the more humid areas. BRAGA (pp. 1007-1009) found leprosy in 0.35 per cent. of 69,764 industrial workers in Rio de Janeiro.

TAXIS BOW

CHAUSSINAND (p. 1006) reviews the history of contact in 1,223 patients in Indo-China: the indication is that the disease may be contracted through contact of comparatively short duration. ATCOCK (p. 712) discusses conjugal leprosy, and the rôles of contagion and hereditary susceptibility: the original should be consulted.

FORBETT and OLSEN (p. 441) report two cases in which leprosy was apparently acquired during the process of tattooing.

STOLPER (p. 91) refers once more to his theory that leprosy is transmitted by the bites of cockroaches, and gives details of their anatomy and ecology.

Aetiology

CHAUSSINAND (p. 187) recognizes four morphological forms of *Mycro leprae*: the normal forms, large forms undergoing evolution (not found in lepromata), those undergoing transverse division (in globi and in stages of rapid multiplication), degenerating forms in patients undergoing successful treatment.

The same author (p. 187) sums up the attempts which have been made to cultivate *Mycro leprae*: there may have been some sign of growth in some attempts, but subculture has proved difficult or impossible and most of the workers who have tried to cultivate the organisms have failed or have been misled by apparent increase in growth of the inoculum. On injection *Mycro leprae* killed by heat give negative local reactions in lepromatous leprosy and positive in tuberculous leprosy; similar injections of other acid-fast organisms give positive reactions in tuberculin-positive persons. *Mycro leprae* are phagocytosed slowly after injection into the body cavity of the wax moth but other acid-fast organisms are rapidly fructigenerated. These tests are useful for recognition of *Mycro leprae*. H. (p. 168) sums up his extensive work on inoculation of leprosy material into animals. This has been very disappointing;

since general infections, of a kind which afford opportunities for testing the value of drugs, could not be induced

DE SOUZA-ARAÚJO and ROSSELL (p 344) have isolated acid-fast bacilli from drainage effluents of a leprosarium in Brazil, on cultivation these organisms resembled those previously cultivated by the authors from leprous material

A modification of the carbol-fuchsin method of staining *Mycobacterium leprae*, in the cold, is described by ZANETTI (p 91), who claims better results than by the hot method

In a paper written some years ago STEINIGER (p 1008) summarized the arguments for the now discredited theory that there is some connection between leprosy and the sapotoxins of *Colocasia* CHAUSSINAND (p 1012) has enquired into this question of *Colocasia* in Cochín-China, like most other workers he concludes that it has no significance

Classification

In discussing the modern classification of leprosy into lepromatous, tuberculoid and uncharacteristic forms, IGNACIO CHALA (p 345) makes the point that the last is a transition stage, and that most patients ultimately become either lepromatous (with negative lepromin test) or tuberculoid (with strongly positive lepromin test) PORTUGAL (p 439) has examined a group of patients in relation to the South American classification He agrees that the uncharacteristic cases may evolve into either tuberculoid or lepromatous disease, but they may remain non-characteristic RODRIGUEZ (p 439) proposes the addition of a fourth type to the three recognized by the Pan-American Conference of 1947 (uncharacteristic, lepromatous, tuberculoid), to which he assigns those types showing only interstitial proliferation He adds various subdivisions of these four main types DE SOUZA LIMA *et al* (p 440) discuss the South American classification in relation to the pathology of the various types and stages It is based on clinical immunological and histological features

DUBOIS (p 438) is critical of the classifications proposed recently by South American workers, and suggests one of his own, based on the bacillary content of the tissues, but allowing for clear distinction of lepromatous, tuberculoid and neural cases It is somewhat complicated

Tests

DHARMENDRA (p 612) has contributed a detailed review of the literature on the lepromin test

NOLASCO (p 613) has shown that lepromin keeps its properties for very long periods even when it is not stored in a refrigerator

AZULAY (p 440) thinks that the mechanism of the lepromin reaction is based on the constitutional reactivity of the tissues, and that this may be accelerated by *Mycobacterium leprae* or *Mycobacterium tuberculosis* In children of leprosy patients, SAYAGO (p 91) found no increase in the tuberculin-positive rate over the rate in controls, but there was a high rate for the lepromin test CONTRERAS and JAQUETI (p 1008) have carried out the lepromin test on persons free from leprosy, and found it positive in 44 per cent, especially in those with tuberculous skin lesions, varicose ulcers, and other skin conditions They therefore regard it as useless for diagnosis

IGNACIO and TIONG (p 612) confirm previous work which showed that there is a tendency of young leprosy children to react more strongly to lepromin with increasing age and with repeated tests There seemed to be a direct relationship between repeated testing and clinical improvement, which may indicate some immunizing value The lepromin test is of prognostic value, children showing consistently weak reactions have poor prognosis CHAUSSINAND (p 1009) confirms the value of the intradermal lepromin test in prognosis In healthy

children, however, he found remarkable response and the lesions

Nov. 1949

Reaction with either the tubercle bacillus

" " prury bacillus—or with BCG

A study by DR VOUTA LIMA and DE SOUZA CAMPOS (p. 717) of 800 patients who were tested with lepromin in 1941 and of the progress of the disease in them, showed that although the test has considerable value in prognosis (especially in tuberculoid leprosy) this is by no means absolute.

Recognizing the value of the lepromin test in prognosis, and the fact that a delayed positive test may be given by persons who have not been in contact with leprosy patients, BECHELLI (p. 1010) suggests that all persons who attend on leprosy patients should be tested. Positive reactors should continue at work but should be re-tested at intervals, and if the test becomes negative their work should be changed. It is however rare for healthy attendants to contract the disease.

FERNANDEZ and MENCAU (p. 611) find that when desiccated *Mycobacterium leprae* (from lepromatous tissue) are suspended in oil, and injected intradermally as in the lepromin test the reaction in 48 hours is intense in all forms of leprosy including the lepromatous form. But similar (though less severe) reactions can be provoked by typhoid bacilli in oil. The late reactions are strongly positive in tuberculoid, but negative in lepromatous cases, but the injection itself sometimes produces a temporary sensitization to lepromin.

DR MILSQUITA (p. 616) describes Seabra's photo-oxidative test in leprosy which has apparently some prognostic significance.

OLIVEIRA CASTRO *et al.* (p. 1010) give the results of a flocculation test which is positive in 73 per cent. of lepromatous cases but rarely in tuberculoid leprosy or other diseases.

Clinical Findings

SPENCER (p. 797) describes the clinical features of leprosy.

MAXALANG (p. 611) has found histological changes in the clinically normal skin of leprosy patients and thinks that these may be the sites of future lesions. He holds that infection takes place only in very young children from skin contact, and quotes evidence for this opinion.

DA VEIGA (p. 1091) describes bone and joint lesions of the hand and feet in various forms of leprosy. The process was chiefly destructive—osteoporosis, rarefying osteitis, cyst-like appearances—and may have been due to vascular disturbance. Osteo-articular lesions were most common in patients with nerve lesions. MOYSTERIC and RAGAZIN (p. 313) describe a case of gonorrhea, apparently due not to syphilis, but to leprosy; they discuss the bone lesions of leprosy.

WOLCOTT (p. 613) makes the point that erythema nodosum occurring in leprosy is often confused with the acute lepra reaction and gives certain points of differentiation between the two conditions. WENTZ (p. 1110) quotes evidence which tends to the view that the lepra reaction is often followed by improvement in lepromatous lesions.

OTERMAYER (p. 138) draws attention to the condition described as diffuse lepra, which is a common form of lepromatous leprosy. It is chronic and which is usually fatal in about eight years. It develops slowly and in a more protracted form for some time but it is highly infective. Cutaneous nodules are absent but there is diffuse infiltration of the skin of the whole body and peculiar lepra reaction in which tender erythematous and infiltrated small nodules appear which become necrotic and leave small sharply-defined scars. The Mitsuda reaction is persistently negative indicating lack of resistance.

by two weeks rest when ferrous sulphate was given. Such courses were repeated. Clinical improvement was great in some (but not all) cases, though bacteriological improvement was not so great. DHARMENDRA and CRATTERJEE (p. 78) describe their experience with diarsone and sulphone in lepromatous leprosy. The clinical results were good but bacteriological improvement was not marked. There was no effect on nerve pains and nerve abscesses but leprosy ulcers healed and eye conditions improved. It is necessary to keep a constant check on the blood by simple haemoglobin estimation and if this is done the treatment is safe. For most cases, however, hydrosulphates remain the best drugs for routine use.

FISCH *et al.* (p. 1011) observed improvement in about two-thirds of patients with lepromatous disease within one year of the start of treatment with promin. The best results were obtained in patients receiving the higher doses (2-3 gm. or more each day). The authors advocate the simultaneous use of chaulmoogra.

Promin is rather less toxic than the other sulphones but JOHANSSON and ERICKSON (p. 613) state that it has no other advantages and that they do not propose to continue its use.

SCHULMAN and CASTIGLIA DI CROCE (p. 1011) examined skin biopsy specimens in lepromatous patients before and after treatment with chaulmoogra or promin. The improvement was very marked with both drugs.

RODRIGUES (p. 814) states that chaulmoogra destroys leprosy bacilli in large numbers and leads to improvement in the lesion but there is risk of precipitation of surviving organisms by the blood. It is wise to give treatment with the sulphones for several weeks before pushing chaulmoogra to the point of clearing of the lesions and dispersal of the organisms so that they may be bactericidal drug in the blood stream. SCHULMAN (p. 441) writes critically of the effect of chaulmoogra in lepromatous leprosy but makes the point that this treatment must be given regularly and in doses of the maximum amount that can be tolerated in the minimum time. When this was done 40 per cent of lepromatous patients were rendered clinically and bacteriologically better and 40 per cent were definitely improved. He supports this view (p. 411) by quoting a group of patients who did not improve on 30-50 c. monthly but who did so on an intensive course of 100-150 c. monthly (see also p. 713).

He writes favourably of iodized hydrosulphates if compared with the ordinary (or iodine) in lepromatous leprosy. From Brazil howe (p. 211) and (p. 714) report most unfavourably on chaulmoogra but has obtained excellent results with promin and diarsone.

FISCH and ERICKSON (p. 447) have tried streptomycin in leprosy but although improvement was noted, it was no greater than that achieved with the sulphones which are less toxic. However it is too early to judge the value of streptomycin. FISCH *et al.* (p. 447) used it for local application for leprosy ulcers and report satisfactory results.

Dr SORELLA ARAUJO (p. 346) has found that streptomycin has some inhibitory action *in vitro* on acid-fast organisms isolated from leprosy patients but it had no curative action when injected into the patient.

FELIX DEZ and BERGER (pp. 911-1013) report favourably on formaldehyde sulphonylate of sodium given intra-arterially or intramuscularly in lepromatous leprosy. It is a reducing agent and they used it for this reason but there are no sure that it is why it produces its effect.

Although antimony is not specific for leprosy, DE VRIES (p. 14) has found it very useful in the lepra reaction and in the bone and bone marrow associated with other drugs.

In a few cases, administration of the anti-histamine drug benadryl gave some benefit during the allergic lepra reaction, Box (p 713) thinks that further trial is indicated

Good result in the treatment of the leprous reaction is claimed by FERNÁNDEZ *et al* (p 1012) who used transfusion of the blood of patients convalescing from that reaction

PICCARDI and RADAELI (p 1092) have investigated the effect of molybdenum and methylene blue on leprous nodules The original abstract gives details

Control

ROTBERG (p 1013) thinks that the fundamental basis of prevention is isolation and treatment of the infective patients Others, for instance those with tuberculoid leprosy, can remain at home if nasal smears are negative Contacts should be tested with lepromin, those who are negative should be examined each week

MACDONALD (p 1014) has written an account of the agricultural leprosy colony at Itu in S Nigeria, and the extensive rehabilitation work accomplished there

Charles Wilcocks

MALARIA

BRUMPT, L C Paludisme autochtone ou paludisme accidentel Contribution à la 'pathologie par la seringue' [Malaria, Indigenous or Accidental Contribution to "Syringe Pathology"] *Bull et Mém Soc Méd Hôpit de Paris* 1949, Nos 9/10, 392-7

The natural transmission of *P falciparum* in northern countries is such an exceptional event that the occurrence of such an infection in a patient who could not have acquired it naturally elsewhere demands a careful inquiry into the possibility of the infection having been injected accidentally, intravenously or otherwise, during the course of some therapeutic procedure Among the cases of indigenous *P falciparum* reported in France six only appear to the author to have been authentic Most of the other infections have been acquired accidentally during the intravenous injection of novarsenobenzol It is pointed out that mycotherapy may be the cause of such infection, neither penicillin nor streptomycin are schizonticides

Norman White

BINCER W Malariological Problems in Poland *Bull Inst Marine & Trop Med, Méd Acad Gdansk, Poland* 1948, v 1, No 1, 59-63, 2 maps

Because of damage distress and large-scale migrations of populations, the disasters of war have always contributed to fluctuations in the incidence of communicable diseases This disturbance of biological balance has been all too clearly illustrated in Central Europe of recent years and has resulted, among other things in increased intensity and diffusion of malaria or in its appearance where it has previously been absent or latent Such events have already been noted in the case of Czechoslovakia [this *Bulletin* 1948 v 45 480] and the author now records the situation in Poland up to 1948

Polish refugees have been repatriated from a very large number of malarious countries and now represent a considerable number of the population Alteration of frontiers has involved inclusion of highly malarious regions on the Baltic coast and the consequent transfer of potential carriers the geographical state of Poland in 1939 and 1946 shown in two maps illustrates this

Inadequate drainage of fields and marshes, destruction of equipment, lack of men and materials, bombing of water piping and an increase in stagnant pools have all led to increased breeding of anophelines, ruined houses harbour adult mosquitoes in large numbers and the vast loss of cattle has destroyed an important screen against malaria in man. Scarcity of drugs and insufficient hospital beds for patients with malaria (particularly in 1945 when so many beds were filled with patients having typhus or typhoid) added to the difficulties.

The measures to meet this situation are discussed. The financial position of the country is still too restricted to allow of adequate large-scale control of mosquito breeding, although much has already been done to reclaim marshes on the Baltic coast. Cattle re-population started by UNRRA will take many years to be effective. Drugs have been supplied on a considerable scale in the form of atabrine, mepracrine and plasmoquine chiefly from the American Red Cross and of 200,000 tablets of proguanil (paludrine) from the WHO. Hospital beds are now available for malaria patients.

Routine malaria surveys are necessary and it is stated that large-scale anti-mosquito measures should be started not later than March. The malaria season begins in April, incidence increases to a peak in July-August, decreases slightly in September and then falls rapidly. Unless very vigorous methods are enforced an increase over the 1947 morbidity is expected.

The principal vector in Poland is *Anopheles marshalli* meunier. The infection is that of *P. vivax* but a new problem has arisen with the influx of repatriates from U.S.S.R., Palestine and East Africa with rising *P. falciparum* infections among them. It seems unlikely that the local vector or general conditions will allow any major propagation of *falciparum* infection in Poland, but potential carriers should be closely watched, particularly in malarious areas. "The nature of the parasite should be stated in all malaria cases around such a vector." Constant vigilance such as this on the part of the Public Health authorities is possible in properly organized anti-malaria centres but microscopes, slides and staff are not always available.

Should the indicated measures fail (or not be undertaken) (1) malaria would develop in Poland to a problem of grave concern to the nation.

H. J. O'D. Burke-Gaffney

TORANZOS, L. B. Casos de paludismo en el Dep. de Mercedes (Provincia de Corrientes). Cases of Malaria in the Department of Mercedes, Corrientes Province.] *Rev. Inst. Bacteriol.* Dr. Carlos G. Malbrán. Buenos Aires, 1941. Sept. 10. No. 2, 196-7.

The Province of Corrientes, with Brazil, Paraguay and Misiones on its borders, all malarious regions, would naturally be expected to suffer from the same infection, especially with the people's resistance lowered by the great prevalence of hookworm. Nevertheless there is little documentary evidence of malaria in Corrientes. It is known that men and women come from outside to work in the rice-fields for example and that they may be arriving malaria. The author therefore thinks it important to call attention to four cases, three of which would appear to have been autochthonous. Two came from Mercedes Department and one from the neighbourhood of plantations on the Corrientes River. One was a woman, 149 years from Mercedes and suffered from chills and heavy sweat and periodic attack of fever but no enlargement of liver or spleen. She suffered from double benign tertian malaria. The second was a child of 3 years brought to the rice-fields in the Corrientes River. He also had a *P. vivax* infection. The third was a woman of 40 years

with "*Tertiana duplex*", and with enlarged liver and spleen. The fourth was a man of 40 who had come from Chaco. His blood showed numerous benign tertian parasites. Mercedes lies at the centre of Corrientes Province and the author has found larvae and adults of *Anopheles*, he is at present studying the species
H. Harold Scott

MACKERRAS, M. J. & LEMERLE, T. H. Laboratory Breeding of *Anopheles punctulatus punctulatus*, Döhlitz Bull. Entom. Res. 1949, May, v, 40, Pt 1, 27-41, 7 figs [11 refs.]

A daily supply of large numbers of young female mosquitoes was required during the wartime investigation into the chemotherapy of experimentally transmitted malaria which was conducted at Cairns, North Queensland, Australia. Other sources having proved inadequate a laboratory colony of *Anopheles punctulatus punctulatus* was eventually established. In this paper the authors describe the equipment which they used and the daily routine which they followed, and also record their observations on the life-cycle and behaviour of this anopheline.

The insectary was 22 feet long, 8 feet wide and 8 feet high. Its eight windows were kept open in summer but were closed in winter when artificial heat was used to maintain the temperature inside the insectary at about 27°C. Direct sunlight never reached the cages in which the adult mosquitoes were kept, but was allowed to fall on the dishes of larvae for part of the day. There were four cages, each 3 feet high and 2 feet square, they had two removable glass sides and two fixed sides of wood, a removable wooden roof and a fixed wooden floor. A strip of moist blanket inside the cages provided damp dry time resting places and maintained a high humidity. Sheets of fresh apple were supplied each night and a blood meal was offered, better results were obtained when the female mosquito fed on a human arm than on an animal. Each cage could accommodate 2 000 adults.

Eggs were laid 72 hours after the first blood meal and 48 hours after subsequent meals. The batches of eggs were kept separate so that the exact age was known. Some eggs hatched after a period of desiccation lasting 5½ days. Early batches consisted of 30 to 100 eggs, but later ones contained 200 to 250. Normally eggs hatched in 42 hours. Favourable conditions for larvae were shallow water, food given in small quantities at frequent intervals rather than in large amounts at one time (the food was a proprietary baby food powder), avoidance of overfeeding and overcrowding, a substrate of mud at first and later of sand, and a water temperature of between 32° and 35°C for at least part of the day. The larval stage lasted from 5 to 8 days. The pupae were always washed in a stream of water when they were being transferred to the pupa dishes. A density of 1,000 pupae per 7 square inches of water surface was found to be ideal. The first pupae to be formed were returned to the breeding cages because they contained a large proportion of male mosquitoes, the later pupae were put into other, special cages where the emerging females were kept awaiting infection. The pupal stage occupied 30 to 40 hours and the emergence rate was between 95 and 100 per cent. Adults usually emerged in the evenings and the females took their first blood meal two days later. They spent the day resting and became active after dusk. Mating and egg-laying took place in flight, when laying her eggs the female hovered about six inches above the water, so that the eggs were scattered and not arranged in groups, a reminder that in nature the breeding places are open pools unobstructed by vegetation. The life-cycle therefore from egg to egg took 13 days.

H. S. Leeson

McARTHUR J. The Anophelids of Tambunan, North Borneo. *Bull. Fauna Res.* 1949 May v 40 Pt 1 53-63.

Anopheline surveys made in Tambunan North Borneo during 1939 to 1942 resulted in the finding of nearly 48,000 larvae of 17 species and varieties of *Anopheles*. Four species formed 89 per cent. of the collection, namely *A. lateralis*, *A. kochi*, *A. maculipes* and *A. philippinensis*. More than 1,000 adults of eight species were captured by various methods, including house searching which yielded only 10 specimens, human bait trapping (172), trapping by native assistants (716), jungle searching (1,628) and animal bait trapping (10,013). In jungle searching *A. philippinensis* provided 1,147 specimens and *A. kochi* 447; the animal bait traps yielded 4,454 *A. philippinensis* and 4,541 *A. kochi* while searches by local people in their defective mosquito nets gave a total of 574 specimens of *A. lateralis*.

A. lateralis was ultimately proved to be the only vector of malaria in the locality. It breeds in swamps in dense jungle shade in the presence of dead leaves. It prefers human rather than animal blood and feeds late at night or early in the morning and departs before daylight.

All the other anophelines in this area are regarded as unimportant as a result of dissections or precipitin tests, or observations on feeding habits or because of their scarcity. In addition to those already mentioned the author includes notes on *A. kerrii*, *A. tessellatus*, *A. barbutator* and *A. latipes* (one female and no larvae) and *A. aethiops* (larvae only of the typical form and three varieties). H. S. LECHE

REID J. A. A Preliminary Account of the Forms of *Anopheles lateralis* Dyar (Diptera: Culicidae). *Proc. Roy. Entom. Soc. of London*, Ser. B, 1949 Apr 15 18 Pt. 3 4 47-53 - figs. 123 etc.

It is now known that *Anopheles lateralis* is an efficient vector of malaria in Assam, Borneo and Burma. The systematics of this species are disturbed and at least 3 varieties are recognized four of which occur in Malaya. These varieties are described and a key is given to the identification of the females. H. S. LECHE

FROHNE W. C. & HART J. W. Overwintering of *Anopheles crucians* Wied. in South Carolina. *J. National Malaria Soc.* 1944 June v 8 No. 2 171-3 2 graphs.

In the vicinity of Manning, South Carolina *Anopheles crucians* survives the winter wholly in the aquatic stages and undergoes retarded larval development. In contrast hibernation by the unemerged female is typical for local *A. quadrimaculatus* while *A. punctipennis* is here breed actively all winter.

MEIX, W. Bluttransfusion und Malaria (Blood Transfusion and Malaria). *Munch. med. Woch.* 1941 July 14 81 No. 28 349-5 - 18 col. A general review and discussion.

BOVEXTER A. Ueber die Gefahr der Malariaübertragung durch Blutkonserven. (The Danger of Transmission of Malaria Infection by Preserved Blood.) *Woch. R.* 1949 May 20 44 No. 20 641-5.

Until the last war it was customary, before carrying out blood-transfusion, to ensure that congenital diseases such as tuberculosis and syphilis were

excluded. Then, when men returned from the tropics reports of inoculated malaria in the tropics began to increase and next came the fear of similar occurrences in non-tropical countries in certain cases where blood was taken from those who had come back from the tropics. Blood kept for three days was then thought to be safe, but this was soon proved wrong and, first, eight days and then three weeks were the periods recommended. Instances have, however, been recorded in which the blood of subjects who have not for many years lived in the tropics and have had no attacks of malaria for long periods has transferred infection. In order to avoid all risk the blood of the donor should be examined, says the author, in thick drop for parasites and by the Henry reaction. [The author in his experimental work has shown that *P. vivax* might remain viable and transmissible in blood kept for 13 days and *P. falciparum* for 21 days. See this *Bulletin*, 1949, v 46, 799.]

H Harold Scott

STRANSKY E On Pernicious Attacks of Malaria in Childhood *J Trop Med & Hyg* 1949, July, v 52, No 7, 140-44

A description is given of three fatal cases of malignant tertian malaria in children in the Philippines.

Case I A Filipino girl aged 12, coming from a region where malaria is endemic. One week before admission to hospital the patient developed a low-grade fever which became intensified. Moderate but continuous headache, pains in the chest and vomiting were present. On admission the child looked weak, pale and jaundiced. Owing to abdominal tenderness the liver and spleen could not be palpated, there were no nervous symptoms but haemorrhages and petechial spots were present, especially on the eyelids, face and arms.

A microcytic anaemia was present (colour index 0.57), a leucocytosis of 39 800 per cmm, marked anisocytosis poikilocytosis polychromatophilia, microcytosis, hypochromia and numerous target cells were found. Many ring forms and some schizonts, merozoites and crescent forms of *Plasmodium falciparum* were present in blood smears. The findings suggested an acute haemolytic anaemia. Aralen [chloroquine] by mouth was given, but the patient died 36 hours after admission.

Autopsy showed the liver to be slightly enlarged and slate-coloured and the spleen twice the normal size and slate-coloured, petechial haemorrhages were found in the cortex and medulla of the kidneys, while numerous malaria parasites were seen in smears of the brain, spleen, liver and kidneys, together with degenerative changes in the liver cells. This was a case of extremely severe infection with *Plasmodium falciparum* of long standing, with an acute exacerbation and severe anaemia.

Case II A Filipino girl aged 4 years and 9 months, who, for the 7 months before admission had lived in an area where malaria is endemic. The chief complaints were fever, cough, headache, abdominal pain and loss of appetite, and 24 hours before admission oedema of the legs developed. On admission, the child was strikingly pale but not jaundiced. *Ascaris* ova were numerous in the faeces and blood examination showed marked anisocytosis, poikilocytosis polychromatophilia microcytosis and hypochromia. Nearly every red cell contained malaria parasites—rings, a few schizonts and crescents of *P. falciparum* while most of the monocytes and many granulocytes showed pigment. The patient died suddenly the day after admission the temperature did not rise above 101°F. Owing to collapsed veins quinine had to be given intramuscularly. At autopsy the most important findings were slate-coloured grey matter in the brain with prominent blood vessels and pin-point haemorrhages massive deposition of malarial pigment in spleen, kidneys, liver and brain while numerous malaria parasites were found in the above organs.

Case III. A boy aged 3 years was admitted to hospital with complaint of anaemia infrequent micturition and high-coloured urine. The patient had been ill for a fortnight previously and also came from a region where malaria was endemic and on admission was pale jaundiced, with a temperature of 101°F and pulse of 160. The spleen but not the liver was palpable. Marked anisocytosis poikilocytosis polychromatophilia, microcytosis and hypochromia were present together with numerous target cells and nucleated red blood cells. A few ring and crescent forms " (presumably of *P. falciparum*) were found in the peripheral blood. The child died the day after admission the clinical diagnosis before blood examination was that of acute haemolytic anaemia.

At autopsy the spleen was found to be enlarged to twice the normal size the brain, except for some congestion and oedema without any malarial pigment was normal and histological examination showed no characteristic findings of cerebral malaria.

Death was " sudden and unexpected " in these three cases and two patients showed signs of cerebral malaria and acute haemolytic anaemia. Pernicious attacks of malaria may develop in childhood without characteristic symptoms, [So they can in adults. In the reviewer's experience this type of case is almost invariably fatal. The chief interest in this paper lies in the very full laboratory and post-mortem examinations.] C. F. Shelton

v HALLER, E. Die Erkrankungsdauer der Malaria (insbesondere der Malaria tertiana). [The Duration of Malaria Infection, especially Benign Tertian.] *Ztschr. f. Hyg. u. Infektionskr.* 1948 Aug 17 v 128 No. 34 770-87 1 fig. (5 refs.)

The author defines duration of infection as the period between the last time of infection and the cessation of the last symptom. He quotes from the literature the times which previous authorities have stated these have ranged between wide limits, from 18 months to 8 years. He next states his own experience of 1,262 soldiers in the Adriatic region and Sardinia none of whom showed any symptoms 18 months after infection with *P. vivax*. He quotes Boyd and others that in inoculated malaria relapses if they occur more than two months later indicate inefficient treatment.

In subtertian infection if the patient remains free from fever for eight weeks and parasites are not seen in a thick drop specimen of the blood, the infection can be regarded as cured and in unfavourable cases the infection he states has died out within a year. The quartan parasite is much more resistant and can remain active in the body for more than 10 years. In view of the varied statements of well-known authorities readers will require more than the mere *ipse dixit* of the author that his findings are of universal application. See also this Bulletin 1948 v 45 970. H. H. Read Scott

COOPER, W. C., RICH, D. S., COATNEY, G. R., JOHNSON, F. & YING, M. D. Studies in Human Malaria. VIII. The Protective and Therapeutic Action of Quinacrine against St. Elizabeth Strain Vivax Malaria. *Amer. J. Hyg.* 1949 Jan. 49 No 1 25-40 8 fig. 22 refs.

During the testing of antimalarial drugs in prisoner volunteers at Atlanta the maximum effects to be expected from quinacrine in protecting against the prevention or cure of the St. Elizabeth strain of *P. vivax* were determined so as to provide an adequate basis for comparison with new drugs which were being tested at near toxic doses.

White male volunteers were each bitten by 10-14 *quadrinaculatus* infected with the St. Elizabeth strain of *P. vivax*. Each mosquito after it had bitten three

volunteers in turn was dissected to determine sporozoite densities. Volunteers were kept under close supervision for 18 months, infections with this strain of *P. vivax* usually exhibit a short early period of activity soon after infection, and a prolonged late period beginning 6 to 12 months after infection.

Quinacrine was given as the hydrochloride, U.S.P., in tablets, each containing 0.1 gm of the salt. Dosages are expressed in terms of the salt. Five men were given quinacrine for four days before, on the day of, and for six days after the day of infection. The dosage was 0.8 gm (0.2 every 6 hours) on the first day, then 0.4 gm on each of the succeeding 10 days—4.8 gm in all. Quinacrine plasma levels approached equilibrium at about 30 microgrammes per litre, about the fourth day after exposure. They did not fall below 10 microgrammes per litre till more than 4 weeks after exposure. These five men had their primary attacks of malaria 242 to 350 days after mosquito bites. Four of five untreated controls simultaneously infected had their primary attacks 13 to 16 days after exposure; the other control had a late primary attack. The delayed activity in the patients protected by quinacrine was characterized by one to three late attacks per patient.

Another group of five volunteers was similarly treated but the administration of 0.4 gm quinacrine was continued for 20 days after exposure. Each man received in all 10.4 gm in 25 days. Mean plasma concentrations of quinacrine from day 0 to day 21 ranged from 102 to 148 microgrammes per litre, and did not fall below 10 microgrammes until more than nine weeks after exposure. These five men had primary attacks from 278 to 323 days after exposure; five untreated controls had their primary attacks 13 to 14 days after exposure.

Quinacrine was used therapeutically in 55 acute attacks of this strain of *P. vivax*. Nineteen patients were treated during early attacks, i.e. those beginning during the first 60 days after infection. Dosage varied in these cases. In no case was there further early activity of the infection, but in 18 of the 19 patients late relapses occurred from 178 to 364 days after the last dose of drug.

Twenty-five late attacks occurring six months or more after exposure were treated with 2.8 gm quinacrine in six days, 0.2 gm every six hours on the first day, 0.1 gm every six hours for the next five days. Treatment was begun on or before the fifth day of patent parasitaemia. Five of eight first late attacks, five of eleven second late attacks and none of six third late attacks were followed by relapse at intervals of from 30 to 66 days from end of treatment. In every case where the last day of treatment was on or before day 305 the patient subsequently relapsed. No case where treatment ended after day 351 showed further evidence of infection.

Three late attacks were treated with larger doses of quinacrine 5.2 gm in 12 days. Each of the three had one additional relapse 39, 42, and 43 days after the last dose of drug.

Five patients who were given suppressive quinacrine 0.1 gm daily from the end of treatment of their late primary attacks through the 14th month after exposure to infection exhibited no further evidence of infection.

No serious toxic effects were encountered during these experiments and no course of therapy had to be modified. There were three instances of nausea, two of vomiting and three of diarrhoea.

Norman White

RUHE, D. S., COOPER, W. C., COATNEY, G. R., JOSEPHSON, E. S. & YOUNG, M. D. Studies in Human Malaria. IX. The Protective and Therapeutic Action of SN 6911 (Sontochnin) against St. Elizabeth Strain Vivax Malaria. *Amer J Hyg* 1949, Jan., v. 49, No. 1, 41-8, 5 figs [11 refs].

The procedure in carrying out these experiments in prisoner volunteers has been described in the authors' paper dealing with quinacrine [above].

SN6911 (Sontochin) was given as the bisulphate monohydrate in tablet form, each tablet containing 0.1 gm. of base. Dosages are expressed in the terms of the base.

Five volunteers were given SN6911 four days before infection on the day of infection and on each of the six following days, 0.8 gm. on the first day and 0.4 gm. on each of the following ten days—4.8 gm. in all. They did not develop patent malaria until 277 to 332 days after infection. Four of five untreated controls had early primary attack 13 to 16 days after infection. The drug was well tolerated, but three of the men had some abdominal distress.

Five volunteers were similarly treated but the medication was continued for 20 days after exposure to infection. They all developed primary attacks 223 to 297 days after infection. Five untreated controls all developed primary attacks 13 to 14 days after infection. All five treated men had gastro-intestinal symptoms: four had anxiety symptoms, insomnia, headache and irritability; all developed a fine tremor of the hands.

Five control subjects were treated with SN6911 during their initial attack. 2.8 gm. in six days—0.8 gm. on the first day, 0.4 gm. on each of the remaining four days. Fever disappeared in two to three days; parasites in from three to four days. All five patients had late relapses 203 to 256 days after the end of treatment.

Four late primary attacks 9.5 to 10.5 months after exposure were similarly treated. Further activity developed in three of these patients 37 to 48 days after the end of treatment. There were no toxic manifestations during the therapeutic trials that might not have been caused by malaria.

SN6911 was not causally prophylactic or curative though it was effective in suppressing and interrupting malaria attacks caused by the St. Elizabeth strain of *P. maei*.
Vernon White

COTNEY G. R., RINE D. S., COOPER W. C., JAMESON E. S. & YOUNG M. D.
Studies in Human Malaria. X. The Protective and Therapeutic Action of Chloroquine (SN 7618) against St. Elizabeth Strain Vivax Malaria. *Proc. J. Hyg.* 1949 Jan. 49 No. 1 49-59 7 figs. 13 refs.

The procedure adopted in these experiments was described in the other paper dealing with pamaquine above. Chloroquine diphosphate was given in capsules or tablets each containing 0.1 gm. of base. Dosages are expressed in terms of the base. Each of five volunteers was given chloroquine on four days before infection with the St. Elizabeth strain of *P. maei* on the day of infection, and on the six following days—0.8 gm. on the first day, 0.4 gm. on each of the succeeding ten days—4.8 gm. in all. They all developed primary attacks of malaria between 254 and 308 days after exposure to infection. Five controls developed malaria 13 to 15 days after exposure. In the treated men detectable concentrations of chloroquine above 10 microgrammes per litre were still present in the plasma 60 days after exposure. The high doses were well tolerated: one subject complained of blurring of vision, nausea and diarrhoea, and another of mild epigastric distress during the first three days of medication.

Five volunteers were treated by a regimen that the medication continued for 20 days after infection. Because of high plasma concentrations (1.5 to 1.894 microgrammes per litre) doses were reduced during the last 5 days of therapy. The total amount given were from 8.7 to 8.4 gm. in 23 days. They all developed primary attacks from 254 to 289 days after exposure to infection. The five control developed patent malaria 13 to 15 days after exposure. All five treated subjects complained of blurring of vision or blurring of

vision which cleared, however, either during or soon after the period of drug administration. Weights, red and white blood cell counts and urine analyses remained normal throughout.

Chloroquine was used in the treatment of 12 early and 11 late attacks of St Elizabeth strain *P vivax* malaria. The early attacks were in controls or in subjects who had received inadequate suppressive medication. The late attacks were relapses beginning later than six months after exposure. Treatment was begun on the fifth day of patent parasitaemia, 0.8 gm on the first day followed by 0.4 gm a day from 1.5 to 5 days. Clearance of parasites and subsidence of fever was rapid in all the early attacks but relapse invariably occurred 164 to 293 days after the end of treatment. Relapses occurred after the treatment of four of seven first late attacks and one of four second late attacks, parasites becoming patent 53 to 85 days after the end of treatment. In the total 23 attacks treated, parasites were cleared from the blood in from one to four days, mean 2.3 days, and fever was terminated in one to two days, mean 1.2 days.

In spite of great activity against erythrocytic parasites chloroquine was neither prophylactic nor curative against the St Elizabeth strain of *P vivax*.
Norman White

COOPER, W C, RUHE, D S, COATNEY, G R, JOSEPHSON, E S, YOUNG, M D & BURGESS, R W. Studies in Human Malaria. XI. The Protective and Therapeutic Action of SN 6771 against St Elizabeth Strain Vivax Malaria. *Amer J Hyg* 1949, Jan, v 49, No 1, 60-66, 5 figs.

SN6771 is 6.6'-diallyl- α , α' -bis (diethylamino)-4,4'-bi-o-cresol. Its value in the suppression and treatment of infections with the St Elizabeth strain of *P vivax* was tested in the manner described above. SN6771 dihydrochloride, 3.0 gm of base a day, was given to five volunteers for four days before infection, on the day of infection, and for six days after infection. Two men developed early primary attacks on the 16th day, two showed early transient parasitaemia but did not develop typical primary attacks till 282 and 291 days after exposure to infection. The remaining subject showed no sign of malaria till 285 days after exposure. Five controls had early primary attacks 13 to 15 days after infection.

In five other volunteers the administration of SN6771 was continued for 20 days after exposure. Their primary attacks were delayed until 258 to 304 days after infection. Each man then had one or two malaria attacks. The 25-day courses were well tolerated, two subjects complained of nausea.

Nineteen late attacks of malaria were treated with SN6771 2.0 gm a day for six days. Parasitaemia and fever were abolished in all cases but the process was slow—two to ten days (mean 5.3) for the clearance of parasites and five days for the removal of fever. Infections became repatent 10 to 16 days after treatment. Relapses occurred after each of the eight first late attacks and after four of seven second late attacks.
Norman White

DE MELLO, J P. Fifty Years of War against Malaria. *East African Med J* 1949, June v 26 No 6 155-7.

A brief historical review.

CAMBURNAC, F J C. Modernos processos de combate ao sezonismo. [Modern Antimalaria Measures.] *An Inst Med Trop* Lisbon 1948, Dec, v 5, 321-39. English summary (6 lines).

A review and a discussion.

of these sites after 47 and 89 hour respectively disclosed a few schizonts some of which appeared to be in Kupffer cells. It is not stated where the remainder appeared to be.

A second biopsy over the 47-hour site taken 9 days and 18 hour after inoculation and the day after detectable parasitaemia, revealed numerous parasites in the liver sinusoid in a circumscribed area. These parasites were schizont segments or merozoites the latter being free in the lumen. These parasites were often associated with the Kupffer and littoral cell. An obvious comment on this statement is that surely this would be fortuitous once the parasites were in the sinusoid and SHERRY & GARNHAM have described and figured the release of merozoites into the sinusoid.

It is also stated that "other parasites were found in c II which could not be identified these may have been hepatic cells."

On the same animal a splenic biopsy was performed 11 days and 18 hour after inoculation. It is stated that "large bodies resembling schizont and segments were observed in the sinus lumen, the pulp rim and the trabecular rim. Despite this resemblance the nodularity of these forms & white thrombi raises a serious question as to whether they were oocystozoic tags. It is further stated that the cellular reaction within and surrounding these structures resembled the reaction associated with segmenting exo-erythrocytic tags. It is mentioned earlier in this paper that this term hardly a valid comparison seeing that previous oocysts resided in the liver and not in the spleen.

In experiment 3 the liver of a monkey was inoculated at site with 24 and 27 heads infected with gland respectively. Liver biopsies were performed after 81 and 144 hour but only the 81-hour site could be taken microscopically.

Schizont and pre-segments the difference between these is not known. I was found and these varied in size between 15 and 35 μ in diameter. The development of a form of 35 μ in diameter from a parasite smaller than four days is difficult to comprehend. The parasites were found in Kupffer cells but some were in hepatic cells. It is stated that the reaction in the inoculation site was composed chiefly of degenerating liver cells mononuclear cells heterophilic eosinophil and large nests of mononuclear phagocytes all typical of an acute inflammatory host response.

In experiment 4 the monkey was given an intra-venous inoculation of the ground thoraces of 223 heads infected mosquitoes and 2 sacrificed 5 days and 19 hour later. Liver and spleen biopsies were made at 44 and 87 hours after inoculation. Air-dried (crushed) smears of the liver at the post mortem showed five oocystozoic parasites with nuclei arranged in number from 5 to 29. It was not possible to determine the type of the host cell. Considering the fact that the post mortem was performed nearly a day after inoculation, the small number of nuclei difficult to account for and no explanation is given.

In the specimen obtained at the biopsy made at 44 hours small parasites resembling the metacryptozoites of a human malaria were found in the Kupffer cells and this is suggested as indicating the possibility that type one segmental occurs about the 40th to 48th hour after infection. A further statement is made that in none of the histological preparation of the parasites show large vacuoles.

A series of control experiments with normal uninfected mosquitoes was carried out with negative result.

A short discussion compares the morphological characters of the pre-erythrocytic tags of *Plasmodium* with those of human malaria parasites of *Plasmodium falciparum*, *Plasmodium vivax* and *Plasmodium malariae*.

[In considering the details of the experiments it is felt that certain points in the description are left somewhat vague. It is not made clear what is meant by the term "biopsy", i.e., whether it refers to a specimen removed by splenic or liver puncture or a specimen of spleen or liver tissue removed by open operation. Again, where inoculations were made into liver directly, it is not stated whether the liver was first exposed by operation in order to make more accurate the location of the respective inoculations.]

Another point to be noted is that it is at least open to question whether results obtained by the crude process of direct inoculation of mosquito tissues into the liver, with the consequent damage to the tissues and the subsequent reaction of the latter, represent conditions in which the data can be fairly compared with those obtained under the more normal conditions which follow the bites of infected mosquitoes.

The paper would appear to bring out some major points of difference when the findings are compared with those obtained in previous work. Thus the impression gained from it is that the author emphasizes that the location of the exo-erythrocytic stages is in cells of the reticulo-endothelial system, in both liver and spleen, rather than in the hepatic cells. Another fundamental point of difference is that in experiment 3, the occurrence is reported of schizonts as large as 38μ only 94 hours after inoculation. This is the more remarkable if, as the author suggests, there is an earlier cryptozoic stage which matures at 40 to 48 hours after inoculation, as the implication would then be that the parasite had grown to a size of 38μ in about 48 hours.

Beyond these remarks further comment would not be justifiable without examination of the actual preparations illustrating the conclusions drawn in the paper.]

H E Shortt

MANWELL, R D & FEIGELSON, P. *Glycolysis in Plasmodium gallinaceum*. *Proc Soc Exper Biol & Med* 1949, Apr, v 70, No 4, 578-82, 3 figs

The authors adapted, with limited success, the technique of BALL and colleagues [this *Bulletin*, 1945, v 42, 867], to the culture of erythrocytic forms of *P. gallinaceum* and made a detailed study of the glucose requirements of the parasite. The strain was maintained by inoculation of 3-week-old chickens with brain suspensions or parasitized blood by the intramuscular or intraperitoneal routes. Blood was collected from the chicken heart, in presence of heparin, during the rise of infection and used in the rocking apparatus of BALL *et al*. The hourly rate of glucose consumption was estimated for undiluted normal and parasitized blood on which differential counts were made. The amount of glucose metabolized by reticulocytes was made possible by rendering chickens anaemic through administration of phenylhydrazine. It was found that the adult chicken red cell uses glucose at about one-seventh the rate of reticulocytes. Depending on the stage of development of the parasite, a parasitized cell on average used twice as much glucose as a reticulocyte. A formula was developed, based on several assumptions, by which the glucose consumption of blood with known cell content could be calculated. The results agreed well with theory and the method should be of value in indicating the probable glucose consumption in culture material.

J D Fulton

JOSEPHSON, E S, TAYLOR, D Jane, GREENBERG, J & NADEL, E M. *The Ascorbic Acid Content of the Adrenal Glands of Chicks infected with Plasmodium gallinaceum*. *J National Malaria Soc* 1949, June, v 8, No 2, 132-6, 1 fig [14 refs]

"The adrenal ascorbic acid concentration in the chick, an animal which requires no dietary ascorbic acid, was unchanged during the course of a

blood-induced malarial (*P. gallinaceum*) infection. There was an absolute increase in ascorbic acid per gland proportional to the degree of adrenal hypertrophy observed during the course of the infection.

"Daily injections of 10 mg. of ascorbic acid had no effect upon the course of parasitemia, day of death or degree of adrenal hypertrophy."

"Withholding of food and water from chicks for 5 days resulted in no change in the adrenal ascorbic acid concentration."

BLACKWATER FEVER

TRINÇÃO C. Pode a exanguino-transfusão apagar-se ao tratamento da febre biliosa hemoglobínica? [Can Exchange Transfusion of Blood be of Service in Blackwater Fever? *An Int Med Trop* Lisbon, 1945 Dec., v 5 263-8. (13 refs.) English summary]

By *exanguino transfusão* the author seems to imply the complete substitution of the blood of the donor for that of the patient. Taking the quantity of blood of an adult as 5 000 cc., he says that introduction of three times this amount, with simultaneous withdrawal of that of the patient, will be necessary to replace 85 per cent. of the patient's blood. Among the causes for which such a procedure might be needed is blackwater fever in order to remove the haemolysins circulating in the patient's blood to relieve the patient from metabolizing his haemoglobin and its derivatives set free in the circulation, and, lastly to repair the acute anaemia. He recalls MARGRAVE'S studies: the effect that the anuria of blackwater fever is due to renal anoxia and not to blockage of the renal tubules (see this *Bulletin* 1945 v 42, 10, 938 1947 v 44, 41) and thinks his method worth a trial. One difficulty would be to obtain so large a quantity of the spot as 15 000 cc. of compatible blood. H. Harold Scott

TRYPANOSOMIASIS

KLEVER, Friedrich Karl. Ein deutscher Trypanari.

This book is reviewed on p. 1101

LALOUZ, J. La trypanosomiase dans le Bas-Oubangui de 1907 à 1944. [Trypanosomiasis in Bas-Oubangui (French Equatorial Africa) from 1907 to 1944.] *Bull Soc Path Exot* 1949 42, Nov 54 229-32. (10 refs.)

This is a historical review of the incidence and distribution of sleeping sickness in the Bas-Oubangui or Sangha-Motaba Sector of French Equatorial Africa: the area includes the basins of the rivers Sangha, M'ba and Likouala-aux-Herbes corresponding to the three districts of Impfondo, Dongou and Férre. Prior (this *Bulletin* 1939 16, 34) gave a sketch-map of the area and described it as situated along and to the west of 700 km. of the river Oubangui which separates it from the Belgian Congo. The Sector was created in 1919 but tours of inspection and treatment were made from 1907 to 1948: the results as regards the distribution and incidence are shown in figures, with comments on changes in local populations and on factors influencing the spread of the disease. The number of sleeping cases, the beds

(percentage of the population) of total morbidity, index of new infections, and index of circulating virus (trypanosomes present in the blood) for 1947 were as follows —

	<i>Impfondo</i>	<i>Dongou</i>	<i>Epéna</i>
Number of cases	484	819	629
Index of new cases	2.5	0.4	1.08
Index of circulating virus	2.6	0.4	1.12
Index of total morbidity, theoretical	13	7.4	8.4

A comparison with the figures for previous years shows that on the whole there has been a considerable improvement in the sleeping sickness position in the area
J F Corson

FERREIRA, F S da C Relatório do Chefe da Missão de Estudo e Combate da Doença do Sono na Guiné referente a 1947 [Report of the Head of the Mission for the Study and Campaign against Sleeping Sickness in Portuguese Guinea in 1947] *An Inst Med Trop* Lisbon 1948, Dec, v 5, 407-44, 2 figs

The organization of the work was still incomplete in 1947 owing to shortage of staff and money but more was done than in 1946, 81,042 people were examined and 782 cases of sleeping sickness were diagnosed (in 1946 the corresponding figures were 15,689 and 404). The remaining population not yet examined numbered 250,000. Polymorphic trypanosomes were found in the three species of tsetse flies present, viz *Glossina palpalis*, *G. longipalpis* and *G. submorsitans*, of 1,456 flies dissected 52 (3.6 per cent) showed polymorphic trypanosomes. The sleeping sickness patients were treated by injections of drugs but details and results are not given in this report. The Commission also investigated the prevalence of guinea worm, filariasis, schistosomiasis, ankylostomiasis and leprosy [See also this *Bulletin*, 1948, v 45, 1069-1070, 1949, v 46, 530]
J F Corson

- 1 VANDERPLANK, F L The Classification of *Glossina morsitans* Westwood (Diptera, Muscidae), including a Description of a New Subspecies, Varieties and Hybrids *Proc Roy Entom Soc of London* Ser B 1949, Apr 15, v 18, Pts 3/4, 56-64, 1 map & 3 pls (1 coloured)
- 11 — Variation in the Male Genitalia of the Tsetse Fly *Glossina pallidipes* (Austen) and a Note on *G. austeni* (Newstead) *Ibid* 65-8, 1 map
- 111 — The Classification of *Glossina palpalis*, including the Descriptions of New Subspecies and Hybrids *Ibid* 69-77, 1 fig, 1 map & 2 pls

1 The first paper contains descriptions of a new subspecies of *Glossina morsitans* (*orientalis*), and of three new races of *G. m. submorsitans* (*congolensis*, *ugandensis* and *gambiensis*). Separation into subspecies and races is based on morphological differences in male genitalia. A map shows that these forms of *G. morsitans* are geographically isolated from one another, subspecies *morsitans* occurs in parts of Southern and Northern Rhodesia and in western and central Tanganyika [the distribution in Bechuanaland is not mentioned or shown on the map], subspecies *orientalis* occurs in the eastern parts of Tanganyika, in Nyasaland and in the northern parts of Portuguese East Africa, subspecies *submorsitans* and its race *gambiensis* occupy a belt in West Africa running east from the mouth of the Gambia river to a point south-east of Lake Chad, east of this is a wide gap and then another fly belt, occupied by race *ugandensis* (1289)

running along the Sudan-Congo border country into Uganda race *congoensis* is shown as occurring in a vast area in central and southern Belgian Congo and in the north of Angola.

On the same map the distribution of *G. sawyeri* in Northern Tanganyika is also indicated.

Descriptions are given of hybrids produced by crossing the various forms of *G. morsitans* the abdomens and male genitalia of these are illustrated.

ii. In the second paper the author records that a few cross-breeding experiments between *G. pallidipes* from different areas produced no significant differences in the offspring that he has not yet been able to cross the West African *G. longipalpis* with *G. pallidipes* and that slight differences observed in the male genitalia of *G. austeni* do not suggest that any races of this species exist. A map shows the distribution of these three tsetse flies *G. paludipes* and *G. austeni* in East Africa and *G. longipalpis* mainly in West Africa but also in the south-east corner of Belgian Congo. (In the text it is stated that *G. pallidipes* occurs in Bechuanaland—this is surely an error. It is not marked on the map.)

iii. The third paper is on the same lines as the first. The subspecies of *G. palpalis* which are described are *G. p. palpalis*, *G. p. martinii*, *G. p. fuscipes* and two new ones *G. p. gambiensis* and *G. p. angolensis*. Relevant portions of the male genitalia are illustrated by drawings and by photograph and a map shows the distribution of the subspecies. *G. p. fuscipes* occurs in Southern Sudan and in Uganda. The extensive distribution shown on the map as existing along the courses of the river Nile and its tributaries in the Sudan region of southern Sudan is an error as also is the absence of any indication of the presence of *G. p. fuscipes* along the Sudan-Congo border. *G. p. martinii* occurs along the upper parts of the Congo River and its tributaries around Lake Tanganyika and as far south as Lake Bangweulu in Northern Rhodesia. *G. p. palpalis* is found along the lower reaches of the Congo River and along its northern tributaries along the west coast and the course of the Niger River. Of the two new subspecies, *G. p. angolensis* is distributed along rivers in the west of Angola and *G. p. gambiensis* is found in Gambia and Senegal. The northerly limits of *G. palpalis* in West Africa shown on this map are 1° S beyond those given by Nash (this Bulletin 1949 v. 48 221).

Descriptions are also given of hybrids produced by crossing various subspecies of *G. palpalis* with each other. None of these hybrids likely to be encountered in nature because the subspecies are so widely separated.

The author has deposited his preserved material in the British Museum for future reference. These important papers should be studied in the original by entomologists interested in these flies. H. V. Leeson

JACKSON C. H. V. The Biology of Tsetse Flies. *Bol. Agric.* 1949 Apr. v. 4 No. 1, 174-69. 797 refs.

Selected field and laboratory studies on the biology of tsetse flies are summarized in this review. After the introduction the subject is conveniently dealt with under the following broad reproductive cycle: the teneral fly, the non-teneral fly, digestion, food and feeding habits and sensus and activity. Most of the literature quoted is latest. *Glossina morsitans*, *G. palpalis* and *G. tachinoides* but there are also references to researches on *G. swynnertoni*, *G. austeni*, *G. pallidipes*, *G. longipalpis*, *G. brevipalpis* and *G. fuscipes*. Many of the papers discussed have been abstracted in this Bulletin and some of them are quoted in *Kenya Mosquitoes* No. 2 published in 1946 by The Bureau of Hygiene & Tropical Diseases. It is noted that temperatures are given in degrees Centigrade.

The reproductive cycle of tsetse flies varies with the temperature but not with the humidity. At 23° [C] it occupies a minimum period of 55 days, 33 of which are spent as pupae. Pupae are able to withstand slight frost and development proceeds at temperatures between 16° and 31° [C], at temperatures above 40° [C] they are killed after various periods of exposure. The natural pupal mortality rate varies from zero to 50 per cent according to temperature.

Adults of some species tolerate slight frost for short times, exposures to 38° [C] or over may be lethal especially if the humidity is high. *Glossina morsitans* and *G. swynnertoni* may live about four weeks in nature but at low temperatures survival depends on saturation deficit. Females commonly live twice as long as males. *G. morsitans*, *G. palpalis* and *G. tachinoides* are most active at about 27° [C] and are inactive outside the limits 15.5° and 41.5° [C].

G. swynnertoni, *G. longipalpis* and *G. pallidipes*, and to a great extent *G. morsitans*, have a mammalian diet, while *G. palpalis* and *G. tachinoides* take much nucleated blood and are scarcely affected by the absence of ungulates. *G. pallidipes* is only slightly attracted to man and is active on moonlight nights, *G. austeni* is often active in complete darkness.

These are only a few of the points touched on in this summary which concludes with a valuable list of the most important works on the subject of biology of tsetse flies from 1907 to 1948. H S Leeson

MEM ACAD SCI IST BOLOGNA 1946-47, Ser 10, v 4, 19 pp, 2 figs

Descrizione della prima infezione contratta in laboratorio da *Trypanosoma evansi*. [First recorded (Human) Laboratory Infection by *Trypanosoma evansi*]

This record is of historical interest. In April, 1912, Professor Lanfranchi was studying animal trypanosomes, *T. brucei* and *T. evansi*. He was drawing up blood from a heavily infected guinea-pig with a pipette when the cotton-wool plug became dislodged and, soaked in blood, entered his mouth. He was suffering at the time with an ulcerated left tonsil. He spat out the plug but continued at his work thinking that there was no risk as the trypanosome with which he was working was "an animal trypanosome and not pathogenic for man". Later he gargled. Thereafter, he suffered from access of fever (there had been rise of temperature for some time owing to the tonsillitis) and sweats "so profuse that it passed through the mattress and wetted the floor" [as mentioned below the patient's recollection for recent events at the time was poor], insomnia, tachycardia paroxysmal in character, enlargement of liver and spleen and lymphatic glands, with loss of memory for recent events and pain in the thumbs and forearms sufficiently acute in the right to prevent his using the right hand for picking up and holding objects. Trypanosomes were present in his blood and these were measured by Mesnil and others, much detail is given of the comparison between these and those of human sleeping sickness (called in this paper Castellanosis). Treatment by atoxyl brought about cure. By measurements and by serological tests Professor Mesnil concluded that the trypanosome which infected Professor Lanfranchi was *T. evansi*.

H Harold Scott

LE ROUZIC, J. Deuxième note sur les premiers essais de chimio-prophylaxie en Afrique Occidentale Française par la Pentamidine. [Second Note on the First Trials of Pentamidine as a Prophylactic Agent against Sleeping Sickness in French West Africa] *Bull. Méd. de l'Afrique Occidentale Française* 1948, v 5, No 1, 89-91.

Later results are given of the field experiment on pentamidine prophylaxis described by BRUN-BUISSON *et al* [this *Bulletin*, 1949, v 46, 123]. The previous

report showed that six months after prophylactic treatment no infection was discovered among 1 002 treated persons while there were 19 cases among the 800 controls (2.1 per cent. infection rate). A follow-up 12 months after treatment now shows only three new cases among the treated persons (0.29 per cent. infection rate) and 24 among the controls (3.1 per cent. infection rate).

In view of these favourable results, this form of chemoprophylaxis is to be applied to 15 000 people in the forest regions of Guinea and Casamance.

E. M. Lewis

OSTERLIN, M. Beitrag zum Problem der Arzneimittelresistenz bei Trypanosomen.
[Contribution on the Problem of Drug Resistance in Trypanosomes.]
Zent.f. Bakt. I Abt. Orig. 1941 Aug. 1 147 No. 5 315-8.

The author discusses the relationship between certain types of chemotherapeutic interference and acquired drug-resistance. For interference the point of fixation of the drug on the trypanosome is presumed to have been impaired by the interfering substance while for resistance the same point of fixation has been unimpaired by the chemotherapeutic agent itself. Somewhat tenuous reasoning then leads the author to expect that by exposing arsenic-resistant trypanosomes to potassium hexatantalate the resistance might be reduced. The main points of the argument seem to be—

(i) The impairment of the trypanosome's receptors which gives rise to resistance is a mechanism of self protection on the part of the trypanosome cell.

(ii) Potassium hexatantalate damages the protective mechanisms of laboratory animals (by interfering with phagocytosis).

(iii) Why then, should it not upset also the protective mechanisms of humbler creatures, i.e. resistant trypanosomes especially, since it may be assumed from interference experiments (BLOKCHAUSS and ROSETHAL *Surfing Sickness Bulletin* 1911 v. 3 115 and 201 SCHWITZER and SILVERSTEIN *this Bulletin* 1927 v. 24 571) that the trypanosome cell has the same points of attachment for potassium hexatantalate as for certain arsenicals and antimonial salts?

(iv) Potassium hexatantalate is readily diffusible and so should be readily absorbed by the trypanosome cell thus providing an excellent opportunity for exercising its influence.

Trypanosomes were separated by centrifugation from heavily infected mouse blood and washed two or three times in Ringer solution containing 0.1 per cent glucose until the surrounding fluid was free of protein. They were then suspended for 1 to 2 hours (temperature not stated) in a solution containing 0.9 per cent sodium chloride 0.1 per cent glucose and 0.1 per cent Tantalum Chloride (A. G.) after which they were inoculated into fresh animals.

In this way the resistance was found to be diminished after 4 to 7 passages (presumably repeating the above procedure after each passage though this is not explicitly stated). With restored arsenic sensitivity there was also restoration of the trypanosome's property of fluorescence on contact with trypanflavin or trykumoline. The trypanosome now is believed merely as *dearsensifizierte* (from 128 der 1 G. *Lebensmittel* 1941).

[These are very interesting findings. Nothing is said as to how long the restored arsenic sensitivity lasted on a frequent repeated animal passage. To cause permanent disappearance of drug resistance would be considerable achievement. For progress that in this direction see 1941 v. this Bulletin 1940 37 B.R.]

E. M. Lewis

LEÓN, L. A. Información sobre el problema de la enfermedad de Chagas en el Ecuador [Report on the Chagas's Disease Problem] *Bol Oficina Sanitaria Panamericana* 1949, June, v 28, No 6, 569-85, 1 map [25 refs] English summary

This account is of considerable interest, historically, epidemiologically and entomologically. Chagas's disease has probably existed in Ecuador for a long time, for *Triatoma dimidiata*, the common vector there, was recorded by Stål in Guayaquil nearly 100 years ago. In 1921, RUBIO observed a rare form of palpebral oedema [now known as Romaña's sign] and VALENZUELA suggested the existence of the disease there. Nevertheless the infection is not rife. In the last 20 years only 18 cases have been reported, 9 of either sex, 10 in adults, 8 in children, 14 acute cases and 4 chronic and, so far, only one fatal. Five species of *Triatoma* are found in Ecuador. *T. dimidiata*, the chief vector. Crespo in 1947 found 25.9 per cent of 748 positive in Guayaquil. *T. d. capitata*, really a subspecies of the last, has been found naturally infected and is easily infectable in the laboratory. *T. carrioni*, also infectable experimentally. *Mestor* (*Panstrongylus*) *rufotuberculatus*, probably synonymous with *T. coxoriufa*, has been found naturally infected. *T. venenosa*, found in Costa Rica, Panama, Colombia and elsewhere, but rare in Ecuador and, if potentially a vector, is of little importance there. *Rhodnius prolixus* has also been found in Ecuador, being a known vector elsewhere, it may be, and probably is, so here also. The chief reservoir host is said to be *Didelphys azarac* [misspelt *azarca*] Azara's opossum [called in this paper a fox] or *D. paraguayensis*. Though cases are not many, it is said that the infection is spreading and the Government is urged to take steps in time to improve the housing and to get rid of the insect vectors.

H. Harold Scott

PINTO, C. Factos curiosos sobre a biologia do "*Triatoma sordida*" Nota Prévia [Some Interesting Facts about the Biology of the "*Triatoma sordida*"] *Rev Brasileira Med* Rio de Janeiro 1949, May, v 6, No 5, 305

The English summary appended to the paper is as follows —

"1 *Triatoma sordida*, one of the transmitters of Carlos Chagas disease (Trypanosomiasis cruzi) is capable of laying eggs through meshes of about one square millimeter. These eggs can be projected at one inch distance out of the vessel where females are kept.

"2 The complete evolutionary cycle of *Triatoma sordida* takes only five months from egg to egg, and took place from September to February in laboratory cultures kept in Rio de Janeiro."

CORNEJO, A. Enfermedad de Chagas-Mazza. Xenodiagnostico. Modificación de Borzone al método de Brumpt [Chagas's Disease. Borzone's Modification of Brumpt's Method of Xenodiagnosis] *Semana Méd* 1949, July 28, v 56, No 30, 181-3, 4 figs

Brumpt's original method of applying to the forearm of the patient the uninfected bugs in a Mazza apparatus covered with gauze was modified by Romaña and Gil who used a test-tube whose mouth was covered by the skin of a recently killed mouse or guinea-pig, the tube containing a sample of the suspected blood, defibrinated or citrated, and introduced this into one with a wider mouth containing 5 or 6 of the bugs to be infected. Borzone's modification consists in collecting 10 cc of blood in a dry syringe. When the blood reaches the laboratory it is placed in a watch-glass or some such receptacle.

and 4-6 larvae of *Triatoma s. fedians* feed on it under cover of a bell-jar and some dark material to resemble night time during which the insects usually bite. When engorged they are set apart at 37°C. and their faeces can be examined from time to time during the 2 months for which the vectors are usually kept before final testing for diagnosis. *H. Harold Scott*

LEISHMANIASIS

Travoso C. A inoculação da *Leishmania donovani* em cultura in vitro da medula óssea e nos ovos embrionados de galinha. [Inoculation of Bone-Marrow and of Fertilized Hen-Eggs with *Leishmania donovani*] *Rev. Inst. Med. Trop. Lisbon*, 1948, Dec. v 5 141-7, 1 pl. (15 refs.) English summary (5 lines)

Several investigators have found that when *Leishmania* were inoculated into tissue cultures their survival time was inverse to the rapidity of growth of the tissue whereas in the yolk-sac of the hen's egg they developed well. The author's studies have confirmed these findings. In the first 24 hours of the marrow cultures the leptomorphous forms appeared to increase in numbers but after 24 hours they became scarce and in 2 days none could be seen. The marrow of a healthy person was tried first and then that of one with myeloma, but the results were the same. The question arose: Was this due to the medium being unsuitable or was it due to phagocytosis? Closer study showed that phagocytosis was intense and early and the phagocytes themselves then rapidly degenerated.

With fertilized eggs the results were very different. Six-day-old fertilized eggs were inoculated in the yolk sac and inoculated at 37°C. When they were examined on the 20th day leptomorphous forms were numerous and the normal development of the embryos had not been checked in any way. Such a method would seem therefore to be an excellent one for preserving strains in the laboratory. *H. Harold Scott*

Fraga L. C. & Li W. C. The Survival of *Leishmania donovani* in *Oryzias latipes* monohits. Reprinted from *Peking Natural History Bull.* 1949 v 17 No. 4 741-3. 10 refs.

1. Experiments showed that *Leishmania donovani* could live in the gut of *O. monohits* for at least 25 days.
2. The *Leishmania* parasites did not develop into flagellates in the tick.

Travoso C. Valor da cloro-hidrólise do soro no diagnóstico da kala-azar. [The Value of the Hydrochloric Acid Gelification Reaction in the Diagnosis of Kala Azar.] *Rev. Inst. Med. Trop. Lisbon*, 1948, Dec. v 5 135-6. 11 refs. English summary (9 lines)

[See this Bulletin 1949, 44, 137]

Travoso C. A siderémia na kala-azar. Serum Iron in Kala Azar. *Rev. Inst. Med. Trop. Lisbon*, 1949, Dec. v 5 131-4. 11 refs.

The English summary appended to the paper is as follows:

"The determination of the serum iron in 16 cases of acute leishmaniasis demonstrates that in every case the serum iron values are normal or increased. Consequently a defect in the iron absorption cannot explain the anemia of the disease."

TRINCÃO, C. O mielograma no kala-azar [The Myelogram in Kala Azar]
An Inst Med Trop Lisbon 1948, Dec, v 5, 99-118 [46 refs]

The English summary appended to the paper is as follows —

"The writer studies the sternal marrow pattern in 5 cases of visceral leishmaniasis of the adult. In every case the bone marrow was active, but the ripening and mitoses curves demonstrated an inhibition of the blood cell production"

TRINCÃO, C. O esplenograma no kala-azar [The Splenogram in Kala Azar]
An Inst Med Trop Lisbon 1948, Dec, v 5, 119-29 [17 refs]

The English summary appended to the paper is as follows —

"The author studies the splenic picture of 13 cases of visceral leishmaniasis, 3 of which were in adult patients. The differential counts vary widely. The number of reticulo-endothelial cells, erythroblasts and granuloblasts is increased"

RUCCI, E. Emazie a bersaglio nella leishmaniosi viscerale umana [Target Cells in Kala Azar] *Acta Med Italica* 1949, July, v 4, No 7, 169-70.

The English summary appended to the paper is as follows —

"The picture of red cells 'a bersaglio' [target cells] has already been described in the haemoparasitosis (leucocytegregrinose, trypanosomiasis of the animals, human malaria) the author describes the same picture in the visceral leishmaniasis of the children. The picture is demonstrable in the spleen and not in the peripheral blood"

LEONARDI, G & PINNA, R. Sui risultati terapeutici dell'antimoniato di N-metilglucamina in un caso di leishmaniosi viscerale resistente al tartrato di sodio e antimonio [Treatment of a Case of Visceral Leishmaniasis by N-methylglucamine of Antimony] *Acta Med Italica* 1949, June, v 4, No 6, 147-50, 1 fig [17 refs] English summary

The usefulness of antimonials in certain tropical diseases is well known but, owing to low grades of tolerance or fear of symptoms of intolerance in even therapeutic doses, new compounds are constantly being manufactured and tried. The patient whose case is recorded here was a man of 35 years who had had malaria in 1946 and recovered. In June 1948 he suffered from fever and sweats which continued intermittently and in September he had pain in the left hypochondrium, the spleen was found to be enlarged and puncture revealed leishmania. Sternal puncture showed that the marrow was crowded with leishmania. He was given intensive treatment with sodium antimony tartrate [dosage not stated], but without effect and a new pentavalent antimonial was tried, *Glucantim* or N-methyl-glucamine antimoniate, injected intramuscularly, 10 cc of a 30 per cent solution. The preparation itself contains 28.35 per cent of antimony and doses of 15 and even 20 cc a day were well tolerated. Altogether "22.55 gm of Sb were given in 18 days" [sic, these are the figures presented, but it seems incredible that such very large doses of antimony could be given. See this *Bulletin*, 1947, v 44, 56]. The splenic enlargement began to show reduction after a very few days and within a fortnight had receded almost to the costal margin, leucocytes had risen to 5,000 per cmm, differential count gave polymorphonuclears 38, large mononuclears 8, lymphocytes 51, eosinophiles 3 per cent. Red corpuscles

numbered 2,490,000 Hb. 56 per cent., and the patient's general condition improved rapidly. Examination of the bone marrow revealed a marked reduction of leishmania on the 1st day and none on the 18th day.

H Harold Scott

12. SOUSA, M. T. & DE ALMEIDA, L. Kala azar infantil stibio-resistente. Tratamento pela lomildine. [A Case of Infantile Kala Azar resistant to Antimony treated with Lomildine. *Rev. Med. Portuguesa* 1949 v. 2, No. 4, 481-8, 1 fig. [?1 refs.]

It has been said that if cases of infantile kala azar were reported as resistant to antimony this was due to the dosage being inadequate. This charge can certainly not apply to the patient whose case is described here. Clinically, it was typical and the description is given in much detail with the results of repeated blood examination. This may be summarized by saying that in spite of repeated courses of injections of neostibosan and blood transfusions after slight transient improvement the condition became gradually worse till the child's state was very precarious. Red cells were down to 1,800,000, leucocytes 2,400 per cmm. Hb. 40 per cent., neutrophils 33, eosinophils 1, lymphocytes 62, platelets 1, metamyelocytes 3 per cent. A fresh drug was then tried antimonate of N-methylglucamine known commercially as Glucantone but a week later the corpuscles had fallen to 1,350,000 and the Hb. to 30 per cent. A new drug was then given a triol dimethanesulphonate of 4-4'-diaminodiphenyl pentane or commercially Lomildine. This was given intramuscularly for 15 doses on alternate days in a 2 per cent. solution in physiological saline starting with 0.5 cc. then 0.5, 1.0, 1.5 cc. etc. to 3.0 cc. At the same time the patient was given liver extract, iron and vitamins B₂ and C. In 3 weeks the temperature which had been falling gradually came to normal, the red cell count increased steadily and in 3½ months the corpuscles numbered 1,100,000 leucocytes 4,000 per cmm. Hb. 65 per cent. A second series of 14 injections had been started after an interval of 17 days, beginning with 1 cc. of the 2 per cent. solution and rising to 3 cc. After another interval, of 40 days a third course was given although everything appeared to be going well and the blood count then gave red cells 9,000,000 leucocytes 5,000 per cmm. Hb. 70 per cent. (Sabb) the general condition was good, the spleen palpable but only 2 cm. below the costal margin and the child's weight had increased by 17.5 kgm.

H Harold Scott

CORRADETTI, A. Studi sulla epidemiologia della leishmaniosi cutanea nella regione del medio Adriatico. I. Incidenza della leishmaniosi cutanea nella zona compresa tra il Tordino e il Vomano. [Epidemiology of Cutaneous Leishmaniasis in the Adriatic Region. I. Incidence in the Zone between the Tordino and Vomano Rivers. *Riv. di Pat. int.* Rome 1948 Dec. v. 9, No. 4, 227-8.

The English summary appended to the paper is as follows:—

An epidemiological survey in the province of Teramo (Abruzzi) has shown that of 28,599 people examined 6,700 (23.7%) were affected by either actual (7.9%) or suspected (20.8%) cutaneous leishmaniasis.

FOURIE, M. A. Jr. Exogenous Cutaneous Leishmaniasis proved by Culture. *Arch. Dermat. & Syph.* 1949 Sept. 48, No. 3, 301-7. (Ref. in footnote.)

A short account of the history of this disease is given. This is a reference to CRANE, CHAM (1935) the author writes: "In England I have led the histologic

picture and stated that there were bodies within the cells which were circular to elliptic in shape" Actually, in an illustration in Cunningham's paper, these bodies are shown, they are typical leishmania]

This is followed by a short description of a case of oriental sore in a student from Aleppo, Syria. He left Aleppo in August 1946. In February and March, 1947, respectively, small lesions, red papules, appeared on the dorsum of his left hand and left ear. These developed into typical orientalsores. Smears showed leishmania. Later, cultures were taken by injecting isotonic saline into the periphery of the lesions and withdrawing it, this material was inoculated into NNH medium and flagellates developed.

The lesions were surgically excised with 1 cm of normal skin surrounding them. The wounds healed, but six months later a small nodule appeared 1 cm proximal to the operation scar on the left hand. This also showed leishmania, but 4 months later it had healed spontaneously.

The author discusses the dangers of the disease becoming endemic in the United States, and the importance of cultural methods to confirm the diagnosis. In support of the latter point, he quotes DOSTROVSKY & SAGHER [this *Bulletin*, 1947, v 44, 1056]. [In view of the absence of any known vectors and the rarity of all *Phlebotomus* species in the United States, the danger of the establishment of this disease can scarcely be very real, and culture is surely unnecessary where unmistakable leishmania, e.g. as shown in the illustration accompanying the author's paper, are found in smears. The main point of the writers quoted was that cultures are frequently positive in the absence of leishmania in the smears.]

L E Napier

HOEPLI, R & FENG, L C. A Comparative Study of Skin Lesions caused by Leishmania, Demodex and Sarcoptes in Dogs and Cats. Reprinted from *Peking Natural History Bull.* 1949, v 17, No 4, 245-50, 6 figs on 3 pls.

FEVERS OF THE TYPHUS GROUP

PRATT, E P, DRYSDALE, A. D & KIRK, R. Typhus Fevers in the Anglo-Egyptian Sudan. *J Trop Med & Hyg.* 1949, Aug, v 52, No 8, 157-60.

Fevers of the typhus group are rare in the Anglo-Egyptian Sudan, between 1898 and 1941 there is no record of the occurrence of any case.

In 1937 Weil-Felix tests were carried out on 1,000 sera sent from all parts of the Sudan for the Kahn or Widal tests, for investigation in cases of fever of unknown origin, or for the purposes of the special enquiry. Only two positive reactions were obtained, in one case the titre with *Proteus* OXK was 1-500, and in the other there was a *Pr* OX2 reaction at 1-250. In neither case could the significance of the reaction be determined.

Sera of 240 rats were tested, none was positive at a titre of 1-50 with any strain of *Proteus*.

In 1939 sera of 222 persons were tested against *Pr* OXK in connexion with the investigation of trachoma, one woman, aged 80, reacted at a titre of 1-125, but no association with a typhus fever could be discovered.

Two cases already reported are mentioned, one was a case which occurred in Juba in 1941 and was described by SOMERS as one of tick typhus, with a *Pr* OX2 reaction of 1-1,250 and a *tache noire*. [See this *Bulletin*, 1946, v 43, 327] the other was a case which occurred in 1943 in the Gezira region, described by STEPHENSON as a problem case with a *Pr* OXK titre of 1-2,500 [See this *Bulletin*, 1945, v 42, 553].

In 1943 an isolated case of typical typhus occurred in Khartoum the *Pr* OX19 titre was 1-500 but the source of infection could not be discovered.

In 1943-44 there were 22 cases of house-borne typhus in Wadi Halfa on the Egyptian border these were obviously associated with the epidemic in Egypt. Rigorous precautions were taken to prevent the spread of infection and no further case occurred in the Sudan.

John H. D. Meyer

KAYŃSKI S & WOJCICHOWSKA, S. Investigation into the Problem of Artificial Feeding of Lice by way of Intrarectal Injections as applied by Weigl. *Bull. Inst. Marine & Trop. Med. Med. Acad. Gdansk Poland* 1949, 2, No. 1/2, 69-80.

Those interested in the cultivation of rickettsiae in lice will find a number of useful hints in this note.

In the artificial feeding of the insects *for rectum* stress is laid on the importance of haemoglobin and glucose as ingredients of the nutritive ementa.

John H. D. Meyer

KAYŃSKI S & WOJCICHOWSKA, S. Influence of various factors upon Virulence and Viability of *R. prowazeki* in Laboratory Breeding by Weigl's Method. *Bull. Inst. Marine & Trop. Med. Med. Acad. Gdansk Poland* 1949, 2, No. 1/2, 49-58 - charts.

Great variations were observed in the virulence to lice of different strains of *Rickettsia prowazeki* which were repeatedly passaged through lice by Weigl's method, but after a long series of passages the variations in virulence became much less.

No association with seasonal influences could be detected to account for the changes in virulence and rate of growth occurring during repeated passages through lice.

The author studied the influence of various factors on virulence including the rickettsial concentration of the suspensions used, for 1/100 of the period of retention of the inoculum in the lice exposure to light, action of phenol, methylene blue and copper presumably copper sulphate.

John H. D. Meyer

VINGUYR, E. *Intérêt de la technique cutanée dans le dosage comparé des rickettsies.* (Points connected with the Intracutaneous Technique in the Estimation of the Comparative Virulence of Rickettsiae. 4th Int. Symp. 1949 May, 78, No. 5, 462-5).

Suspensions of three strains of *Rickettsia prowazeki* were tested by the Guérin's intradermal test. It was found that suspension made in milk diluted egg-white or nutrient broth were more suitable for maintaining the virulence of the rickettsiae than those made in distilled water or in glucose water.

The former group of suspensions when hypodermally injected into guinea pigs were found to be more suitable for use in the test than those prepared in any suitable medium.

John H. D. Meyer

BRILL, G. H. & OHLING, Lily. *Indurating Antigens of Rickettsiae*. *J. Biol. Chem.* 1949 Aug. 1, 178, No. 2, 45-51.

By immunizing rabbits with the non-indurating supernatant fluid obtained by centrifuging fresh suspensions of living *Rickettsia prowazeki* serum was obtained which was capable of neutralizing rickettsial suspensions by mixing them into tubes.

The serum also had pronounced anti-infectious properties, though these were not so great as those of standard immune sera

The serum when added to rickettsial suspensions, whether fresh or after treatment by heat or disinfectants, converted the toxic factor to a toxoid, so that it is possible to prepare a vaccine of high potency and low toxicity

For details of the experiments the original paper must be consulted

John W D Megaw

FRANK, H R Die Serumtherapie des klassischen und murinen Fleckfiebers Grundlagen, Ergebnisse, Indikation [Serum Therapy of Classical and Murine Typhus] *Ztschr f Hyg u Infektionskr* 1948, Aug 17, v 128, Nos 3/4, 294-330, 1 fig [125 refs]

This paper is really a comprehensive, though concise, monograph on the serum therapy of louse-borne and murine typhus In two bibliographies there are 125 references to the literature up to the year 1948

The author's personal experience is described in six pages out of the 36 of which the paper consists Altogether 22 patients were treated but only eight of the cases are described, in these the treatment was started before the appearance of a rash, which, in fact, never developed in unmistakable form, presumably because of the inhibiting action of the serum The diagnosis was confirmed by the occurrence of a rising-titre Weil-Felix reaction which was positive with dilutions of 1-1,600 to 1-6,400 Two of these cases are of special interest, the treatment was started on the 2nd day with intravenous doses of 99 and 90 cc of convalescent serum, and further doses ranging from 52 to 120 cc were given on each of the following two days In both cases the temperature fell nearly to normal two days after the first dose was given and remained nearly normal till the 8th and 9th days, respectively, when there was a further spell of fever which lasted two days in each case and apparently yielded to two additional doses of serum

All but one of the other six cases belonging to this group were very mild, but three of them had been inoculated and in one of the uninoculated patients a high temperature persisted till the 8th day in spite of two injections of serum given on the 4th and 5th days

Little is said of the 14 cases in which the treatment was started after the appearance of the rash, from a table it appears that the average duration of the fever was 14.6 days, almost the same as in the 26 untreated controls in which it was 14.9 days

The rest of the article consists of a critical, fully documented, review of the literature The conclusions reached were that serum treatment started before the appearance of the rash was strikingly effective and that there were clear indications of its value up to the 5th day Treatment started between the 5th and 9th days appeared in some cases to have had a favourable effect, but after the 10th day it was useless

[The situation was greatly changed since the author wrote the present article The proved efficacy of chloromycetin and aureomycin is likely to discourage the use of specific antisera, especially as these have a restricted sphere of efficacy and availability]

John W D Megaw

PEREIRA, H G, TRAVASSOS, J & VASCONCELOS, J V Tifo murino no Rio de Janeiro I Ocorrência de ratos naturalmente infectados [Murine Typhus in Rio de Janeiro Natural Infection among Rats] *Hospital Rio de Janeiro* 1949, May, v 35, No 5, 679-87 [11 refs] English summary

Nine out of the first 50 rats examined by the authors in Rio de Janeiro gave positive reactions with the complement-fixation and rickettsia-agglutination

tests for murine typhus. Two strains of *Rickettsia mooseri* were isolated from the sera of the only four reacting rats that were tested by guinea-pig inoculation. Each strain was obtained from the pooled sera of two rats.

Only four of the nine reacting rats gave positive Weil-Felix reactions, at titres of 1-80, 1-320, 1-320 and 1-640 respectively, and only two of these four had given positive reactions with the other tests. An attempt was made without success, to isolate rickettsiae from the rat whose Weil-Felix titre was 1-640; this was one of the rats that gave negative reactions with the other tests.

There was a striking degree of correlation between the complement fixation and rickettsia agglutination tests: the titres observed were 1-20 to 1-320 with the former and 1-40 to 1-320 with the latter test.

John H. D. Ugg

GISPEX R., SMIT A. M. & WESTERHOF C. D. Epidemic Scrub Typhus in Batavia. *Documenta Neerlandica et Indonemica de Morbis Propriis*. Amsterdam, 1949. June v. 1 No. 1, 131-41. 1 fig. (1 refs.)

The author describes an outbreak of scrub typhus in which 20 persons living in Batavia City were attacked between December 1947 and May 1949. There were probably many more cases which were not detected.

The Weil-Felix titres (*Proctus OAK*) ranged from 1-800 to 1-6,400; an echard occurred in four cases, and rickettsiae were isolated from two of the patients.

Although the outbreak was in an urban area 13 of 15 patients whose previous movements were known had been in close contact with tall *alang gram* (referred to as *alang gram* in many reports) growing by the side of a canal, so that the disease occurred in association with conditions of the rural type.

Rats infested with *Trombididae* larvae were caught in and near the houses at the border of the grassy area.

John H. D. Morgan

JOHNS H. L. Jr & KING, J. A. Tsurugamushi Disease. Report of a Case. *U.S. War Med. Bull.* 1949, July-Aug. v. 49 No. 4, 71-5. (10 refs.)

A case of tsurugamushi disease (scrub typhus) is presented. Among the unusual features encountered were: (a) the petechiae on the buccal mucosa; (b) the presence of a positive Weil-Felix, OAK, in the patient's dog; and (c) the important epidemiological fact that this is the first authenticated case, to our knowledge, that has been reported in China.

HAYASHI, H. & WATANABE, M. On the Possibility of Appearance of Rickettsiae in the Circulating Blood after the Recovery of (from) Rickettsiosis. *Akiyama Arch. Exper. Med.* 1949, Nov. v. 1 No. 2, 133-41.

The blood of a patient convalescent from an attack of tsurugamushi disease was found infective up to at least 8 days after defervescence. The patient had been inoculated for therapeutic purposes with the Escardoux strain of rickettsia, and infectivity was tested at intervals. On each occasion, dose of typhoid vaccine was given and the blood sample was taken two hours after the end of the febrile reaction that resulted. On three different occasions, person inoculated intravenously and subcutaneously with the blood developed a typical attack of tsurugamushi disease with a rising titre Weil-Felix reaction of the *Proctus OAK* type.

In another experiment on the same lines a person inoculated with blood from an infected patient 34 days after defervescence developed a very mild

attack, but by a series of passages, first through a rat and then through a series of mice, rickettsiae were isolated

John W D Megaw

SMADAL, J E, JACKSON, Elizabeth B & CRUISE, Anita B Chloromycetin in Experimental Rickettsial Infections *J Immunology* 1949, May, v 62, No 1, 49-65, 2 figs [15 refs]

Chloromycetin was shown to have a pronounced rickettsiostatic action when introduced into chick embryos infected with *Rickettsia tsutsugamushi* [orientalis] *R mooseri*, *R akari*, *R prowazeki*, and *R burneti*

The average prolongation of the life of the embryos was usually slightly greater when the injections were made half an hour before inoculation with the infecting rickettsiae than in those injected 24 or 48 hours after inoculation, but in the case of *R burneti* the prolongation was greatest in a batch of embryos treated 42 hours after inoculation

Mice infected with lethal doses of the Karp and Kostival strains of *R tsutsugamushi* nearly always survived after treatment with suitable doses of the drug, given intraperitoneally or orally The Serangayee and Bue strains were much more resistant to the drug, which had to be given in larger doses and for longer periods to obtain effective action The response to treatment of the other strains tested was intermediate between that of the above two pairs of strains

Rickettsiae could be recovered from the tissues of successfully treated mice, in one case up to 100 days after infection, although the treatment was continued throughout the whole period

Mice infected with *R akari* and *R mooseri*, and guinea pigs infected with *R rickettsi*, responded well to the treatment, but contrary to what happened with *R tsutsugamushi*, rickettsiae could not be recovered from the tissues of the animals *R rickettsi* did not respond as well as the others

The drug had no rickettsiacidal action *in vitro* on *R tsutsugamushi*

Blood levels of the drug in mice, treated intraperitoneally, were tested at frequent intervals, the maximum level was reached in about half an hour and then fell rapidly, reaching negligible proportions within three or four hours

Full details of the numerous experiments carried out by the authors will be found in the paper

John W D Megaw

PRATT, H D, LANE, J E & HARMSTON F C New Locality Records for *Allodermanyssus sanguineus*, Vector of Rickettsialpox *J Econom Entom* 1949, June, v 42, No 3, 414-15, 1 fig

The findings were in named areas in Illinois and Utah

GEAR, J & HARRINGTON, A L Tick-Bite Fever - Two Cases treated with Aureomycin (Lederle), a New Antibiotic *South African Med J* 1949, June 25, v 23, No 26, 507-8, 2 figs

Strikingly good results were obtained by aureomycin treatment in two cases of tick-bite fever, "the variety of tick typhus occurring in South Africa."

Treatment, by the mouth, was started on the 4th day in one case and on the 5th day in the other In both cases there was rapid amelioration of the symptoms, fading of the rash, and a fall to normal of the temperature within two days

One of the patients, aged 17, received a total quantity of 4.0 gm given in doses of 250 mgm every four hours, the other patient, aged 4½ years, received 2.25 gm in doses of 250 mgm in syrup thrice daily for three days

The drug was given in doses considerably smaller than those employed by Ross *et al.* in cases of Rocky Mountain spotted fever (see this *Bulletin*, 1949 v 46 357).

[The efficacy of small doses is an important point in view of reports of reactions which though usually slight apparently may in rare cases be severe or even fatal (see this *Bulletin* 1949 v 46 25).] John H. D. Meyer

LIPPETT H. & CASTLETT F. H. Zur Komplement Bindung des Q-Fiebers. (Complement Fixation in Q Fever) *Deut. med. Woch.* 1949 July 29 v 74 No. 29 918-19

The authors describe the confirmation by complement fixation tests of the diagnosis of Q fever as the cause of the laboratory outbreak which occurred at Hamburg in 1947-48 (see this *Bulletin* 1949 v 46, 628).

The antigen employed was the Italian (Hentzerling) strain of *Rickettsia burnetii* obtained from the Bethesda, U.S.A., laboratory.

Apparently every person engaged in handling the strains isolated in the Hamburg laboratory became infected. The only one who appeared to have escaped still gave a positive reaction. John H. D. Meyer

KLORSTOCK, A. KLORSTOCK E. & ROSENKRANZ G. The First Diagnosed Outbreak of Q-Fever in Israel. *Harefuah* Jerusalem, 1949 July 1 v 7 No. 1 In Hebrew 12. English summary —]

During this outbreak, positive complement-fixation tests with *R. burnetii* (Italian strain) were obtained in 5 of 234 sera in titres of 1/32 to 1/2048. In four cases, four to 64 fold rises in titre occurred. In five the reaction rose from negative to 1/128.

Most of the cases occurred in Haifa and were chiefly in males. There appeared to be no contact with cows or goats in most cases and as the outbreak started in winter ticks and other insects could be excluded as vectors. Dust from material handled in Haifa might account for the infection but no source has yet been determined. The outbreak has been non-epidemic and protracted over several months. Most of the negative sera were from cases of atypical pneumonia. H. J. O'D. Burke-Gaffney

WEGMANN T. Encephalitis nach Q-Fever. Encephalitis after Q-Fever. *Schweiz. med. Woch.* 1949 July 30 v 79 No. 30 690-92, 16 15 r 15

The first recorded case of encephalitis after Q fever is described. The onset was eight days after deferrescence from a proved attack which lasted ten days. The first symptom was tremor of the right hand. Soon there were 6 paresthesia, involution of the sleep period, diminished sensibility to touch over the right hand and arm, slurring speech, and exaggeration of knee jerks. The attack lasted about six weeks. Recovery was complete.

The disease is believed to be similar to the encephalitis known to follow smallpox vaccination, measles, rubella, varicella, parotitis, influenza and other virus diseases. The author inclines to the view that the condition is one of neuro-allergy associated with the antigen-antibody reaction. John H. D. Meyer

ALVAREZ, D. M. La fiebre de Dallas como problema fronterizo. Bull. Fed. 25 6. Border Problem. *Del Oficina Sanitaria P. americana* 1949, July 25. No. 7 696-701 1 map. English summary

BARTONELLOSIS

CORRADETTI, A. Esperimento di prevenzione della verruga peruviana e della malaria nella valle del Rio Santa Eulalia (Perù) [Experiment in Prevention of Verruga Peruviana and of Malaria in the St Eulalia Valley, Peru] *Riv di Parassit* Rome 1949, Mar, v 10, No 1, 53-8, 3 figs English summary (4 lines)

In 1947 work was started on the construction of a new pipeline, to reinforce the hydro-electric power supply of the City of Lima, in the Valley of Santa Eulalia. The River Santa Eulalia flows south-west to join the River Rimac, at an altitude of 1,000 metres, 50 kilometres from Lima. Work was concentrated in the lower 20 kilometres of the Valley, up to a height of about 1,800 metres. Both verruga peruviana and malaria are notoriously prevalent in the Santa Eulalia Valley. The problem was to protect the labour force from infection by both these diseases, 3,185 persons were involved. The two disease vectors concerned were *Anopheles pseudopunctipennis* and *Phlebotomus verrucarum*.

In March and April all the dwellings, huts and animal houses in the area were sprayed internally with DDT, 2.5 gm per square metre of surface treated. External walls that furnished a favourable habitat for phlebotomus were sprayed with a slightly higher concentration of DDT. In August the spraying of houses was repeated, 1.29 gm per square metre.

Constant inspection failed to find *A. pseudopunctipennis* in the dwellings during this period and sandflies disappeared suddenly after the spraying. Protection from both diseases was complete.

Norman White

YELLOW FEVER

KUMM, H. W. Estudos da febre amarela silvestre no Brasil durante os dez últimos anos [Studies on Jungle Yellow Fever in Brazil during the Past Ten Years] Reprinted from *Anais do VII Congresso Brasileiro de Higiene, reunido em São Paulo, de 12 a 19 de dezembro de 1948* 9 pp, 4 maps [32 refs]

This paper was presented at the Seventh Brazilian Congress of Hygiene, São Paulo, 1948. In it the author sums up a large amount of work [most of which has been reviewed in this *Bulletin*] dating from about the time when SHANNON, WHITMAN and FRANCA isolated the virus from *Haemagogus capricornis*, *Aedes leucocelaenus* and a group of Sabethine mosquitoes, all caught wild in the forest. In the region where these captures were made, *Haemagogus spegazzini* is commoner than *H. capricornis*, and the importance of *H. spegazzini* as a vector has been confirmed by LAEMMERT *et al* [this *Bulletin*, 1947, v 44, 414]. The two species, which at one time were regarded as the same, can be distinguished by the terminalia of the males, but this is not very helpful in field work [see also this *Bulletin*, 1945, v 42, 609, footnote].

The author discusses the animal reservoir of yellow fever, and gives spot-maps showing the distribution of human cases (1939-48), the places where immune bodies have been detected in various genera of Primates, and the places where various species of *Haemagogus* and *Aedes leucocelaenus* have been found. He notes that marking experiments have shown that *H. spegazzini* and *Aedes leucocelaenus* can fly 10 and 6 kilometres respectively from the point of liberation.

Charles Wilcocks

RABIES

WILLIAMS R. B. *Epidemic of Rabies in Interior Alaska 1945-47* *Canad. J. Comp. Med.* 1949 June v 13 No 6 176-183 1 map.

In the present article proof is adduced that rabies is widespread over Interior Alaska and reached epidemic proportions during 1945-47. It emerges that the causative virus is firmly established in the territory's wildlife population and that rabies in the fox constitutes a major problem in control. Thus in Alaska the wild animals, especially the fox are a reservoir of infection for dogs and other species, including man.

During the 1945-47 epidemic it was possible by clinical and laboratory examination to demonstrate the disease in 7 foxes, 3 dogs and 1 wolf. No deaths from rabies among human beings were recorded—a circumstance which may apart from the obvious difficulty of collecting accurate information in such a territory be explained by the availability of anti-rabies treatment and the heavier and the more protective nature of the wool and fur clothing worn in these latitudes.

G. Stuart

VERLINDE J. D. & KRETZ A. Failure to cultivate Rabies Virus in Vitro *Antonie van Leeuwenhoek J. Microbiol. & Sewol.* 1949 v 15 No 1 71-8

"Report of the unsuccessful cultivation of rabies fixed virus in a cell free medium consisting of steamed sheep-brain extract glycine peptone and a number of accessory factors (tryptophan, ascorbic, nicotinic acid, amide pyridoxine hydrochloride, sodium pantothenate and lactoflavin). After 1 and 48 hours incubation at 37°C under aerobic conditions, the virus had completely lost its virulence and did not induce immunity to reinoculation with active virus.

WIKK R. C. & ECKER E. E. Time of Appearance of Antibodies to Brain in the Human receiving Anti-Rabies Vaccine. *Proc. Soc. Exp. Biol. & Med.* 1949 Apr v 70 No. 4 734-7 7 figs. 13 refs.

For many years it has been known that a disseminated type of encephalomyelitis can be produced in experimental animals by the injection of either homologous or heterologous brain tissue and that the lesion found in this condition closely resembles those present in human demyelinating diseases including the encephalomyelitis which follows anti-rabies treatment. Consequently the possibility has been suggested that re-immunization to brain tissue may be the factor responsible for the production of these diseases and, in particular, of the encephalomyelitis occasionally observed to complicate the administration of anti-rabies vaccine inasmuch as in the latter the injection of heterologous brain tissue parallels in many respects the experimental procedure followed with the experimental animals.

It seemed of interest to the authors therefore to ascertain in a preliminary study if bitten persons treated with simple plasma killed rabbit brain virus vaccine whether or not such treatment did in fact lead to the development of anti-brain antibodies in the patient sera. To this end antigens prepared from the white matter of fresh human brain were employed for (1) the immunization of rabbits to determine the antigenicity of the brain extract used and (2) the titration of the sera of the five patients receiving the anti-rabies vaccine. As regards (1) results confirmed that antibodies to brain tissue are produced in the rabbit by the intracerebral injection of foreign brain substance. As regards (2) the findings may be summarized as follows:

In three patients, to whom the routine 14 daily injections had been given, the sera showed a negative complement-fixation reaction until the 15th to 18th day, when antibodies to the brain antigen made their appearance. In the fourth patient who, without personal history of allergy, had been compelled on account of excessive local reactions to discontinue treatment after the fifth injection, a condition necessitating admission to hospital and diagnosed provisionally as "possible encephalitis following anti-rabies treatment" developed six days after the first injection and continued until his recovery and discharge from hospital 14 days later. In this case samples of sera, obtained on the 9th and 12th day after the beginning of symptoms, showed a high titre of complement fixation when compared with the sera taken from the other cases investigated. In the fifth patient no anti-brain antibodies occurring after treatment with anti-rabies vaccine were at any time demonstrable.

Results of the authors' present investigation adduce evidence that antibodies to human brain are produced in patients receiving the Semple anti-rabies vaccine. The fourth case suggests the possibility that a markedly increased anti-brain antibody titre may occur in those patients who develop an encephalitis after this treatment.

G. Stuart

PLAGUE

P'AN, H. S. TCHAN, Y. T. & POCHON, J. Etude cytologique de *Pasteurella pestis* soumis à l'influence du bactériophage spécifique. I. Modifications morphologiques de l'appareil nucléaire. [A Cytological Study of the Effect of Specific Bacteriophage on *Past. pestis*. I. Morphological Changes in the Nuclear Apparatus.] *Ann. Inst. Pasteur* 1949, May, v. 76, No. 5, 468-70, 4 figs.

The authors had previously demonstrated the presence of nuclear material in *Past. pestis* by the technique of ROBINOW. They described two nuclear granules in each resting cell which fused to form a single dumb-bell-shaped structure during the process of bacterial division. Fragmentation of this structure into four chromatin granules preceded protoplasmic fission, so that each daughter cell had two nuclear granules as in the original resting cell.

In organisms exposed to the action of a specific phage, the normal process of nuclear division did not take place. Both the bacterial bodies and the nuclear material showed marked swelling. The two nuclear granules fused together to form thick chromatin rods which became elongated and filamentous with further increase in size of the bacterial body. After four to five hours' exposure to phage action, the nuclear material gradually became indistinguishable with the final disruption of the organism. The authors contrast this sequence of events with that seen in susceptible organisms exposed to the action of penicillin in which nuclear division was unimpaired but fission did not take place, so that giant bacterial forms with multiple nuclei were eventually seen.

B. Moore

CHOLERA

KAMAL A. M., with G. A. MESSIR & Z. KOLTA. Experiences in the Recent Cholera Epidemic in Egypt. Reprinted from *J. Egyptian Pub. Health Ass.* 1948, 185-96. 3 charts (1 folding). [13 refs.]

This paper presents the personal conclusions of the authors on the observations made during the outbreak of cholera in Egypt, most of which have already been published.

GRANT, M. H. & MURRAY, M. V. Clinical and Biochemical Studies in Cholera and the Rationale of Treatment. *Trans. Roy Soc Trop Med & Hyg* 1949 July v 43 No. 1 81-88. [14 refs.]

In discussing the clinical and biochemical observations made on cases of cholera during the Egyptian epidemic of 1947 the author presents his findings on the losses incurred and the deductions made as to the suitable methods of treatment for their rectification. The findings are in general, in accordance with usual experience.

Dehydration.—Clinical severity was found to be in direct proportion to clinical dehydration and to the number of evacuations that had occurred. It was related to both water and electrolyte loss and not to either alone. The water loss is considered to be more important as no special clinical manifestations could be ascribed to salt depletion alone. The author considers that the use of isotonic rather than hypertonic saline for transfusion is indicated. The specific gravity of the plasma is the best single indicator of the degree of dehydration and a guide to calculating the amount of fluid needed for correction.

Blood and urine chlorides.—Blood chloride was found to be raised in all cases. In 16 cases the figure ranged from 520 to 710 mgm. per cent. The higher figures were associated with a severer grade of dehydration and indicated the necessity for energetic treatment.

It was considered, however that the estimation of plasma chlorides is fallacious as an indicator of the total loss of chlorides because of the tendency to hypertonicity in the diminished extracellular fluid. Urine chlorides were low in all cases on admission and, taking into account the small amount of urine passed, the total excretion indicated marked salt depletion. No correlation was found between urine and blood chlorides—the urine chloride levels form a better measure of the total chloride loss and a guide to salt therapy.

Potassium loss.—Disturbance of electrolyte balance occurs in cholera and a diminution of blood potassium was found in the majority of cases examined. This did not bear any relationship to clinical severity and no special clinical manifestations were attributed to it. It is suggested that the lower levels found may have been due to loss in the excreta in the absence of intake. Investigations on the point are indicated.

Plasma proteins.—About two-thirds of the cases examined showed hyperproteinuria and one-third showed hypoproteinuria. The differences are attributed to the balance of the factors of blood concentration and protein loss. Possible factors producing protein loss are discussed. The author considers that cases showing hypoproteinuria should be given plasma transfusion and that the indication for this would be the figure of the specific gravity of the plasma. (Other workers in Egypt have considered that plasma transfusion is contraindicated in cholera.)

Azoetemia.—Azoetemia was demonstrated in two-thirds of the cases studied. It has no relation to clinical severity. It disappeared in all but three cases under treatment. Although it is mainly related to dehydration and circulatory failure it has no relation to the degree of blood concentration, or hypochloroemia. A renal factor of toxic nature in the production of azoetemia is suggested by the present work.

The mechanism, effects and prognostic significance of anuria and the importance of its rapid correction are discussed.

Treatment.—Detailed recommendations for treatment are presented. Isotonic solution or preferably Ringer's solution, is advised for transfusion to begin with, until urine chlorides reach 5 grammes per litre or more and, after that, the same solution made hypotonic by the addition of an equal amount of 5 per cent. glucose solution. The use of sodium lactate is recommended for

amoebiasis may occur in epidemic form even in the temperate zone. It may also be pointed out that carrier rates are high in the Northern States such as Minnesota and Pennsylvania and constitute a potential source of danger even in the temperate zone. On the other hand some epidemiologists have not yet fully accepted the view that amoebiasis is water-borne and consider that the Chicago epidemic was so unusual that it should be considered as an exception rather than the rule.

Observations show that many people may be infected with *E. histolytica* and yet show no symptoms and have no history of dysentery. It has therefore been suggested recently that the Chicago epidemic might have been an outbreak of bacillary dysentery among a population with a high carrier rate of *E. histolytica*.

Clinically the cases of amoebic dysentery may be divided into two groups: primary and secondary dysentery. The primary cases are those that develop dysentery after the direct ingestion of infective material. The secondary cases are those that have been carriers for months or even years and develop amoebic dysentery upon the introduction of certain secondary factors.

The incubation period of the naturally infected cases may be as short as nine days but in the secondary cases the period is difficult to assess. The authors of 16 selected cases from the Chicago epidemic gave the following incubation periods:—

less than 11 days	23 per cent
between 11 and 20 days	23
between 21 and 30 days	23
between 31 and 120 days	3

On account of the relatively long incubation period in the majority of cases the extent of the epidemic was not realized during the outbreak because there were only 15 cases which were connected with the two hotels involved and reported to the Chicago Board of Health. The size of the epidemic was only disclosed by the questionnaire survey made later.

Amoebic cysts may survive in water or sewage for a few days to almost three months depending on the temperature of the suspending medium. The cysts are only slightly heavier than water so that one cannot depend on storage of water or sewage for removal of cysts unless a long period is allowed for sedimentation. Perhaps one of the best methods of removing amoebic cysts is by flocculation and filtration through pressure filters, 94 per cent being removed. If chlorination is the only method available for the destruction of cysts in water then superchlorination or breakpoint chlorination must be employed.

For emergency treatment of water to destroy cysts, up to hypochlorination at pH 5.0 to 6.0 followed by dechlorination or treatment with elemental iodine to give a residual of about 4 to 5 ppm in 10 minutes at pH 5.4 to 6.0 would be satisfactory.

E. H. HILL, F.R.S.

CODELEONTINI F. Studio statistico sulle parassitosi intestinali nello Sleso.
(Intestinal Parasitism in Sleso. *Atti M. S. Italiana* 1919 July 4 N. 7
174-8, 1 chart. English summary (2 lines).)

In Addis Ababa the Imperial Ethiopian Medical Research Institute has a good laboratory under Professor Guagunt. In this paper the author reports on the results of the examination of 7,600 samples of faeces in the six years July 1941-June 1947 inclusive. The samples were the second or third results examined in fresh stool after saline purgation. Of the total, 4,732 (60.1 per cent.) were positive for some parasite or other. 424 were positive among 1,607 samples from Europeans (26.3 per cent.) and 4,308 among 6,995

Ethiopians (68.7). The parasite most commonly found was *Entamoeba histolytica* (1,611), *E. coli* was next (1,243), *Chilomastix mesnili* came third, but a long way behind (357), and then, in order, *Trichomonas* (288), *Trichuris* (280) [mentioned as *Trichocephalus*, but further down in the same list is *Trichuris trichiura* 77], *Giardia* (260), of the cestodes *Taenia saginata* was found in 191, but *T. solium* once only and that in a European, *Ascaris lumbricoides* was not common (136) and *Ancylostoma* in 97 only. *Schistosoma* [species not mentioned] was seen once only, in an Egyptian immigrant.

H. Harold Scott

MONTERO, E. & URIBE, V. Correlación endoscópica, parasitológica y serológica en el diagnóstico de la amebiasis (Comunicación preliminar) [Correlation of Endoscopy and Parasitological and Serological Examinations in the Diagnosis of Amoebic Infection] *Rev. Med. Chile* 1949, Mar., v 77, No 3, 143-8 [38 refs.]

In more than 70 per cent of fatal cases of amoebic dysentery lesions are found in the rectum and sigmoid, and MANSON-BAHR has shown that in 90 per cent of 258 patients with parasitological evidence of intestinal amoebiasis such lesions are visible by endoscopy [this *Bulletin*, 1942, v 39, 29], thus, in 10 per cent (some authors give a much higher figure), in spite of the infection, no local lesions are found by endoscopy, the higher levels of the colon or the caecum being attacked. There is no need to stress the frequency with which the *Entamoeba* is not found by direct faecal examination. The results of complement fixation tests vary greatly in the hands of different authors and according to the nature of the antigen used.

In the present investigation, the authors have carried out all three methods in 70 patients: 17 with acute amoebic dysentery, 27 with chronic intestinal amoebiasis, but no dysentery, 10 with amoebic hepatitis or liver abscess, and 16 with non-amoebic conditions as controls, among them 3 normal subjects, 5 with ulcerative colitis and 4 with chronic diarrhoea. The lesions as seen by endoscopy the authors divide into three grades: I Small crateriform depressions, 1-3 mm in diameter and in groups, seen by oblique illumination; II Superficial erosions, 3-5 mm in diameter, with slight bleeding; III Typical ulcers and submucous abscesses. The parasitological examination was made of material taken with a pipette and examined at once fresh or in iodine solution, or, if the material was sufficient, concentrated by the centrifugation-floatation method with sulphate of zinc [this *Bulletin*, 1939, v 36, 144, 1940, v 37, 62]. Complement fixation was carried out with the Bozecevic, Hoyem and Walston technique as modified by REES *et al.* [this *Bulletin*, 1943, v 40, 456].

The results are very interesting and instructive. Of the 17 with acute amoebic dysentery endoscopy showed 5 of grade II and 12 of grade III, 13 were positive by direct examination for protozoa, 13 gave a positive complement fixation. Of the 27 with chronic amoebiasis, by endoscopy 17 were grade I, 9 grade II and 1 grade III, 9 only showed protozoa by direct examination and only 2 gave a positive fixation of complement. Next, the 10 with amoebic hepatitis: endoscopy showed 4 grade I, 2 grade II and 1 grade III, the other 3 showed no local lesion in the rectum or sigmoid, 5 were positive parasitologically and 8 gave a positive complement fixation. Of the 16 controls none was positive either parasitologically or by complement fixation tests.

Endoscopic examination thus proved the best, especially for chronic cases without dysentery, while complement fixation was of special value in hepatic conditions secondary to amoebiasis of the intestine, where the sigmoidoscope reveals no lesions.

H. Harold Scott

MARGUEZ R. J. Em torno da sintomatologia da amebíase crônica. (On the Symptomatology of Chronic Amebiasis.) *Med Cirurg Farmacia*. Rio de Janeiro. 1949 Feb.-Mar. Nos. 134/135 101-8. [18 refs.]

Now that infection with *Entamoeba histolytica* is no longer almost exclusively tropical, this paper is very salutary for those practising in non-tropical countries and where those who have lived in the tropics have settled elsewhere. The author shows, with illustrative cases, that symptoms of a somewhat vague character such as headache, general pains, loss of appetite, general weakness and "nervousness," palpitation, formication, backache, giddiness, cold and sweaty hands, irritability, "liverishness" and many others may be due to at all events associated with, *E. histolytica* infection and clear up when the infection is specifically treated. To some among the patients mentioned vitamins, liver extract and all sorts of nostrums had been given: one had had his appendix removed without benefit. [There is much to be said in favour of the routine examination of the faeces of any patient who gives a history of residence abroad whatever his symptoms, and the laugh is not always on the side of those who taunt the tropical practitioner with being one of those "Who never his see sees. Until he sees faeces"] H. Harold Scott

TURNBULL, G. C. & COOLEY, J. C. The Clinical Significance of a High Right Diaphragm in the Diagnosis of Amebiasis and Amebic Hepatitis. *Med Times*. New York. 1949 Aug. v. 77 No. 8, 343-7 1 fig.

This paper contains nothing original, but its purpose is to direct attention to the fact that in (some) cases of amoebic hepatitis and amoebic liver abscess the right cupola of the diaphragm is raised (and it might be added, fixed). After appropriate specific treatment it becomes progressively less so. Five illustrative cases are cited. [It is stated that amoebic liver involvement "is usually secondary to intestinal amoebiasis" but surely it is always so, again in the report of case 5 biopsy of a rectal stricture yielded "*Entamoeba histolytica* cysts in the throes," a most improbable finding.]

A. R. D. Adams

ARMSTRONG, W. A Case of Cutaneous Amebiasis. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949 July v. 43 No. 1 79-80 1 fig.

The author has seen two cutaneous lesions in the New Hebrides which appeared to be due to amoebiasis (presumably *E. histolytica*) and one of these is described and illustrated by a photograph.

The patient came to hospital in 1917 with a course discharging, papillomatous type of fungating mass on the scrotum. This had been present for about three years without treatment. The discharge was rich in amoebae.

Emetine 1 gram daily and a local dressing of 1 per cent. carbarsone solution caused the discharge to cease within three or four days after which the carbarsone dressings were replaced by a paint of salicylic acid in tinct. benz. co. Emetine was continued for ten days. The paint was little effective in reducing the warty mass, but glacial acetic acid rapidly cleared the area. There had been no recurrence by May 1948. H. J. O'D. Burke-Gaffney

SWARTZWELDER, J. C. & MCGILL, H. C. Jr. Intestinal Amebiasis complicated by Abscess of the Brain. Report of a Case without Hepatic or Pulmonary Involvement. *Rev. A. de Med. Trop. Parasit.* 1949 Mar-Apr. v. 8, Nos. 3-4 77-9 2 figs. 10 refs.

"*Entamoeba histolytica* trophozoites were cultured from brain abscess material obtained at autopsy from a 45 year old male with amoebic colitis.

A remarkable feature was the absence of amebic lesions of the liver and the lung. This case represents the fifth in a series of brain abscess of amebic etiology without involvement of the liver and the lungs."

RAWKINS, M D & KONSTAM, G L S Complete Heart-Block associated with Amoebic Hepatitis Normal Rhythm restored with Emetine *Lancet* 1949, July 23, 152-3, 5 figs

Heart block in association with amoebiasis is a rarity, only three references to it have been found in the literature of the last 20 years. In these cases auriculo-ventricular dissociation occurred during periods of acute dysentery, the heart condition in two of them improved as a result of emetine treatment but the third patient, a child of five suffering from malnutrition, died. The present record is of a returned British officer, aged 28, who had suffered periodic diarrhoea since service in the Western Desert six years previously. He complained of attacks of giddiness and faintness of brief duration which recurred several times daily, during these the heart seemed to miss beats, and there was lower sternal discomfort and pain in the shoulders. The patient was in quite good condition, the pulse rate was 40 and regular, it rose to 60 on exercise, the liver dullness extended to the fourth space in the mid-axillary line. Screening showed the right dome of the diaphragm to be raised and fixed, its outline was blurred, and there was mottling of the base of the right lung, and this extended to the right root region. The condition was considered to be an amoebic hepatitis with inflammatory changes in the neighbouring lung, though no parasites were found on repeated stool examination, sigmoidoscopy revealed no abnormality, the leucocyte count was 8,000 per cmm. [and there was no pyrexia]

Frequent daily Stokes-Adams attacks occurred, with asystole for three to four seconds, a cardiogram showed complete heart-block, with an auricular rate of 88 and ventricular of 31 per minute, the ventricular rate was slightly irregular. X-rays showed the transverse diameter of the heart to be increased both to the left and to the right, the left auricle was not enlarged.

Daily intramuscular injections of 1 grain of emetine caused the chest pain to disappear and the pulse rate to rise to 80 by the third day, but there were still extra systoles at every third or fourth beat. The heart-block and the Stokes-Adams attacks ceased after the third day of emetine treatment. On completion of the course of emetine (11 grains) the rhythm was normal and the sinus rate 40, with P-R interval 0.2 seconds. By this time there was free movement of the diaphragm, which was normal in level and contour, the heart was more vertical and its contour normal. A cardiogram one month after beginning treatment showed sinus bradycardia with a rate of 45, the P-R interval was 0.24 second. In another three weeks the sinus rate was 70, with a normal rhythm and a P-R interval of 0.2 second, there were no extra-systoles. The heart-block in this case the authors think possibly to have been due either to toxæmia or to a metastatic amoebic infection, in view of the rapid response to specific treatment they favour the latter explanation.

A R D Adams

PARMER, L G & COTTRILL, C W Distribution of Emetine in Tissues *J Lab & Clin Med* 1949, June, v 34, No 6, 818-21

This report deals with the distribution of emetine in the tissues of rabbits after single intramuscular injection of 6 mgm per kilo of the hydrochloride in aqueous solution. Fifty-seven animals were used and were killed at intervals of from half an hour to 64 days after injection, for determination of the amount of alkaloid present in various organs. Similar determinations have recently been made by GIMBLE *et al* [this *Bulletin*, 1949, v 46, 467]. The method of estimation employed was based on that of BRODIE *et al* [this *Bulletin*,

It had been suggested previously that the difference in effect of emetine in hepatic and intestinal amoebiasis was due to the differences in concentration of drug in the various organs (PARMER, this Bulletin 1949, v 45 1034) but this view does not seem to be borne out by the present results. The maximum concentration of emetine was generally reached in tissues within 24 hours of administration and after a further similar period the level declined. Some organs were free of emetine within two weeks, in others it persisted a little longer and was detectable for some further weeks in the spleen. Although the concentration in contractile tissues was low these organs appear to be most affected by the drug and it is suggested that their metabolism of glycogen is interfered with. It is still not clear how the drug exerts its effect on *E. histolytica*. J. D. Fulton

THOMSON P. E. & LILLICREY Betty L. Chemotherapy of Experimental *Endamoeba histolytica* Infection in Dogs. Amer. J. Trop. Med. 1949 May v 29 No. 3 323-30 3 figs. (23 refs.)

The need for a suitable host in chemotherapeutic studies of experimental amoebiasis is still apparent. The present authors used dogs aged 6 to 12 months after examination to exclude natural amoebic infection (which was not found) and after treatment with tetrachlorethylene to free them from helminthic infections. The animals were kept in individual cages on an essentially fish diet which was regarded as of importance in maintaining an acute or subacute infection [see FAUST *et al.* this Bulletin 1935 v 12, 777]. They were readily susceptible to infections with *E. histolytica* maintained in culture or passaged from dog to dog by means of a rectal catheter which extended as far as the ileocecal valve and the mortality among infected animals was low. Several million amoebae were given in each inoculum. To obtain faecal samples for examination colonic irrigation was employed. Since only 71 animals were used for evaluating 10 compounds the numbers in each group were necessarily small, sometimes only one dog was used. The authors in spite of some obvious disadvantages of such a large host as the dog, consider that animal to be suitable for chemotherapeutic tests because it can readily be infected and acquires an acute or subacute infection lasting for several months with resultant ulcers and shallow ulceration without infection of other organs. From the results of treatment with emetine, carbamezone, chinolon and diodoquin the correlation between the responses obtained in canine and human amoebiasis was considered satisfactory. The three latter were curative but not emetine, amonquin or chloroquine (both the latter being 4-aminoquinolines). (Chloroquine has recently been reported as effective in human amoebiasis see C. A. this Bulletin 1948, v 45 430 also MARROW BAKER, *ibid.* 1949 v 46 744.) Antibacterial agents including penicillin, streptomycin, sulphadiazine and succinylsulphathiazole proved ineffective in treatment and this suggested that the amoebae rather than the bacteria present were responsible for the lesions encountered. J. D. Fulton

BARRETO J. G. & GUTIERREZ ESTIVILL E. Absceso hepático amibiano curado con cloroquina. Amoebic Abscess of the Liver cured by Chloroquine. Rev. And. M. L. Trop. y Parasit. 1949 Mar-Apr v 5 No. 3 431-7 3 figs. (31 refs.; English summary)

A very interesting case of hepatic abscess is reported in detail in a boy of 17. The physical signs were apparently typical, but an exploratory puncture

yielded greenish-yellow pus in which no trophozoites of *E histolytica* could be demonstrated. The faeces were also negative and there was only a slight leucocytosis (9,800 per cmm).

During the course of open operation thick yellow gelatinous pus was revealed in which also no *E histolytica* individuals could be seen, though, on culture, staphylococci and streptococci were isolated. From the seventh day after the operation increasingly numerous active amoebae (of which figures are given) were seen moving about in the pus. During this interval the patient had been under continuous treatment with streptomycin as well as penicillin. On the eleventh day this treatment was discontinued and chloroquine diphosphate (Tanakan) by mouth instituted (12.5 gm in 26 days) without the supervention of any toxic symptoms. Five days after chloroquine treatment was started the amoebae had disappeared from the pus. On the fourteenth day of the chloroquine course the operation wound had healed satisfactorily. The condition of the patient was excellent and he had put on 31 lb in weight in 2½ months after the operation date. It is therefore concluded that chloroquine cures hepatic amoebiasis. It is clearly stated that no emetine was administered.

In a footnote, Tanakan is stated to be "chloroquine quinoline diphosphate", each tablet containing 0.25 gm which is equivalent to 0.155 gm of the base. It also contains starch (0.07 gm) and colloidal Kaolin (0.45 gm).

[For other references to this treatment of amoebic abscess, see this *Bulletin*, 1949, v 46, 744] P Manson-Bahr

- i ALAIN, M, MASSAL, E, TOUZIN, R & PORTE, L. Le traitement de l'amibiase par la Conessine. Résultats d'une experimentation faite à l'hôpital Michel-Levy, Hôpital d'Instruction de l'Ecole d'Application du Service de Santé des Troupes Coloniales. [Treatment of Amoebiasis with Conessine. Results of Trials at the Michel-Levy Hospital, Marseilles] *Méd Trop Marseilles* 1949, Jan-Feb, v 9, No 1, 5-38, 3 charts
- ii SOULAGE, J. Expérimentation de la "Conessine" (Roquessine). Compte-rendu de l'essai thérapeutique effectuée au Centre Médical des F.T.E.O. (Hôpital Grall-Saigon). [Trials with Conessine (Roquessine) at the Medical Centre, Saigon] *Ibid* 39-97, 9 charts & 10 figs
- iii SIGUIER, F, PIETTE, M & CROSNIER, J. Etude expérimentale comparative de la Conessine et de l'Emetine. [Experimental Comparison between Conessine and Emetine] *Ibid* 99-109, 2 figs

The first number of the ninth volume of *Médecine Tropicale* is devoted to three reports on the use of conessine in the treatment of amoebiasis, and to an extensive bibliography on the drug. Since the French workers at Dakar [this *Bulletin*, 1948, v 45, 905] redirected attention to the therapeutic efficiency in the treatment of amoebiasis of the alkaloids of *Holarrhena africana*, and in particular of conessine, several other French workers have reported most favourably on it [this *Bulletin*, 1948, v 45, 1086, 1949, v 46, 365, 469]. The first two of the three papers summarized below consist of reports on the treatment of patients suffering from various forms of amoebiasis, in France and in Cochinchina, with "Roquessine", a proprietary preparation of conessine hydrochloride put up in cachets each containing 0.1 gm of the compound for oral administration. The third paper contains an account of the action of conessine *in vitro* as compared with that of emetine, there are some studies on its excretion in the faeces and the urine, and its relative concentrations in the fluid and cellular contents of the blood have been estimated. In an appendix there are lists of references in the literature, arranged in chronological sequence, to the plant and its derivatives.

These papers contain much detail which it is impossible to summarise they should be consulted in the original by those interested.

1. Of forty patients suffering from amoebiasis, contracted chiefly in Indo-China, thirty-eight withstood a full course of treatment with coneosine at the Michel Lévy military hospital at Marseilles during 1948. Two other patients began the drug, which had to be stopped on account of the development of serious toxic manifestations. The findings and progress in each case are recorded in detail. Most of these persons had previously had repeated treatments with the accepted drugs many of them were suffering from a chronic dysentery which proved refractory to the usual therapy.

With the use of Blanc's classification the cases completing treatment could be relegated to one of the following clinical types of amoebiasis —

Type 1 — Acute intestinal relapse (6 patients)

Type 2 — Chronic intestinal amoebiasis

(a) with diarrhoea (6 patients)

(b) with alternating diarrhoea and constipation (3 patients)

Type 3. — True chronic amoebic dysentery (18 patients)

Type 4 — Hepatic amoebiasis (5 patients).

Type 1 cases (6) were given at least 4 gm. of "Rorpesalbe" orally over a period of ten days. Acute symptoms usually subsided by the second or third days of treatment the stools became formed by the fourth, and amoebae disappeared concurrently. Cysts are also said to have vanished, but subsequently reappeared intermittently. Sigmoidoscopy showed healing of ulceration in two of the cases, and substantial diminution in ulceration in another three. In all the general physical condition rapidly improved.

Type 2 (a) cases (6) in which emetine is stated to be of little value showed an equally rapid response to coneosine in doses of 4-8 gm. and upwards over 13 or more days. Relapses, however subsequently occurred.

(From one of the six patients listed no amoebae or cysts were recovered to substantiate the diagnosis which was based on a past history of dysentery. This patient had ascariasis, and did not benefit from treatment with santhoin or chenopodium or with sulphaguanidine emetine or coneosine.)

Type 2 (b) cases (3) also rapidly improved with coneosine (11 gm.) but colonic dysfunction continued, as in the preceding type.

[From one of the three patients listed no parasites other than *Giardia* were recovered another was passing cysts only in spite of the evacuation of five to six loose motions each 24 hours.]

Type 3 cases (18) all of whom had been suffering from continuous acute dysentery had previously failed to benefit from the classical treatments including emetine penicillin and sulphaguanidine. In all of them symptoms vanished during the second day of treatment the stools from 12 of them were formed by the sixth day but in three others they were occasionally loose and in the remaining three they continued constantly so. Amoebae had disappeared from the stools by the fourth day but in five cases later recurred. In seven cases cysts appeared transiently about the 10th to 14th day and these from their appearance were thought to be non-viable they then vanished from the stools. Ulceration of the bowel showed healing by the 30th day in nine patients in four others additional coneosine treatment eventually produced healing but in the remaining case examined by sigmoidoscopy the ulceration persisted. Abdominal physical signs had vanished after treatment in four cases diminished in ten but persisted in the remaining four. The general health and condition in all was restored in such a striking manner as to suggest a "cure" in some of them. In three of four cases where diarrhoea recurred

soon after treatment a second course of conessine after a couple of months produced the desired effect, but the fourth patient required a third course of conessine to achieve this

Type 4 cases (5) with pre-suppurative hepatitis or, in one case, recrudescence after drainage of a liver abscess with extension to the right lung, all responded in a "spectacular" manner to conessine treatment and symptoms and signs vanished

After detailing the clinical response of the various types of amoebiasis to conessine treatment the authors turn their attention to the optimum dosage, and to the toxic manifestations produced by the drug. The pharmacology of conessine has already been examined by English and Indian workers, and more recently it has been re-examined by the French workers, in particular at Dakar [see this *Bulletin*, 1948, v 45, 905, 1086, 1949, v 46, 365, 469]. The authors gave five doses each of 0.1 gm of conessine hydrochloride in cachets ("Roquessine") daily for five days, and immediately followed this by three doses of 0.1 gm daily until the necessary total dosage was reached. This total ranged from 2.5 gm to 6.1 gm in different cases, the average was 4 gm for a case of acute intestinal relapse, 4.8 gm for a case of chronic intestinal amoebiasis with diarrhoea, 4.1 gm for a similar case with alternating diarrhoea and constipation, 5.0 gm for one of true chronic amoebic dysentery, and 4.6 gm for one of hepatic amoebiasis. Five patients underwent a second course of treatment between 30 and 113 days of completion of the first course, and one patient had three courses of conessine treatment, totalling 14.5 gm of the drug, in 112 days. Tests of the urine with Tanret's reagent showed that the excretion of the drug varied in a manner unrelated to the daily or to the total dosage of the drug.

"Roquessine" by the mouth caused no intestinal upset of significance, but gave rise to a bitter taste in the mouth, it commonly led to difficulty in getting to sleep, and nightmares. In some cases motor and psychic disturbances developed, and in two instances these were serious and in one of these mania developed which required prolonged shock treatment, this patient had a psychopathic personal and family history. Buzzing in the ears, giddiness, and temporal headache were encountered, and these often were associated with tremors of the extremities, and of the tongue, these did not interfere with normal activities and disappeared during complete relaxation. Persons of unstable psychological make-up suffered most from these troubles, and Gardenal at bedtime usually, but not invariably, resolved them, they were most evident early in treatment, and in any event spontaneously vanished a few days after its completion. The blood pressure was not affected by conessine, but in about half the cases treated there was some change in the red cell count and haemoglobin content of the blood. In four instances the values for these were raised, in seven reduced (in three markedly so), but no abnormal red cells were seen, liver therapy rapidly restored the counts to normal. Minor variations were observed in the total leucocyte counts and differential counts, but no abnormal white cells were seen.

The authors conclude that conessine is an excellent specific therapeutic remedy in all forms of amoebiasis, and it produces remarkable relief of the manifestations directly attributable to the parasite but, like other amoebicidal drugs, it fails to correct the sequelae of intestinal amoebiasis, in particular colonic dysfunction.

11 During July 1948 in Saigon, Cochinchina, 135 patients of whom 129 were Europeans, were treated with "Roquessine", 105 others were similarly treated during August and September. These patients included sufferers from amoebiasis in all its forms. Kurchi bismuth iodide [a preparation of *Holarrhena*, also known as *Kurchi*] in 5-grain tablets had become available in

between the fourth and ninth days and amoebae vanished from the stools in 48 hours together with co-existent flagellates, but cysts usually persisted to the end of treatment

In 15 acute cases of relapsing intestinal amoebiasis (with from two to seven relapses), all of whom had received previous emetine treatment, and some of them penicillin and sulphaguanidine, parasites disappeared in two or three days and the stools became normal usually between the third and sixth days, symptoms disappeared and the appetite, general condition, and in some cases the weights of the patients were restored to normal by the end of treatment. So successful was the treatment that men were retained in the East whose condition before treatment seemed to necessitate repatriation

Two cases of "true chronic amoebic dysentery" were treated, one of which had proved refractory to emetine treatment, and the other to emetine-penicillin-sulphaguanidine and to arsenicals, in the former a course of "Roquessine" caused the disappearance of amoebae from the stools and their replacement by cysts in three days, the stools becoming formed by the 17th day. In the second, though the drug caused sympathetic disturbance and insomnia, the abdominal pains disappeared, the appetite was restored and the patient gained weight, but the stools continued loose throughout the ten days' treatment though subsequently they became formed

Twelve cases of chronic amoebiasis with diarrhoea were treated. In only six of these were amoebae present in the stools at the time of treatment, in three they had been found at an earlier date [in the remaining three none had been detected]. In seven of these cases the stools became formed between the 6th and the 27th days, in three cases although the stools remained loose the symptoms and signs abated, in one case, of nearly ten years' duration and repeatedly treated with emetine, no benefit resulted from "Roquessine" treatment, and in yet another also there was no improvement following it

Two cases of chronic amoebiasis with constipation [in one of which no parasites had been found and the history and physical signs were very dubious] were treated with "Roquessine" and both cleared up in a spectacular fashion

In two cases of chronic amoebiasis with alternating constipation and diarrhoea the symptoms disappeared within 15 to 20 days

Three patients suffering from sequelae of amoebiasis were treated with conessine. The first presented a classical picture of sprue [but no evidence of amoebiasis] which had resisted classical sprue treatment, this patient was much improved if not cured, by a course of conessine. Another similar case, but with a history of amoebiasis parasitologically diagnosed in 1926 and treated with emetine in 1947, temporarily benefited from conessine treatment but relapsed. The third, another classical case of sprue, who had had parasitologically diagnosed amoebiasis in 1946 and been treated with emetine, improved with conessine treatment

Twelve cases of pre-suppurative amoebic hepatitis, four without pyrexia, responded immediately to conessine treatment, the symptoms and signs of liver involvement and of acute intestinal amoebiasis rapidly vanishing. In addition a case of pulmonary amoebiasis secondary to liver infection rapidly cleared up with conessine treatment

The author concludes that the therapeutic results obtained in the treatment of the first 135 cases of amoebiasis of all types in Cochin China are comparable to those obtained at Dakar. While the response to treatment varies with the type of case, the aggregate results are good. In early acute amoebiasis they were remarkably good, in relapsing acute amoebiasis they were good but the response was less rapid, in chronic relapsing amoebiasis although the results were encouraging too few cases were treated to arrive at any firm conclusion, though it was evident that conessine can be substituted for emetine in such

cases when the latter proves inadequate. In chronic amoebiasis with diarrhoea the results were inconstant, good results being obtained in only half the cases; in chronic amoebiasis with constipation the results were good; in chronic amoebiasis with alternating constipation and diarrhoea the results were also quite good. In cases of sprue—a sequel of amoebiasis—the results were contradictory. In cases of pre-suppurative hepatitis the results were excellent.

"Roquesure" caused amoebae to vanish from the stools in two to three days but they often persisted in the colon (sigmoidoscopic scrapings); cysts in the stools were unaffected by coeseine treatment. Flagellates were present vanished from the stools, but an *Entamoeba coli* infestation was unaffected by the drug. In view of the persistence of an *E. histolytica* infection in so many cases after coeseine treatment this should be followed by a course of treatment with stovarsol.

As an appendix are recorded briefly the results of treatment of 105 additional cases of various types of amoebiasis. These confirm the provisional conclusions reached above.

iii. Only after thirty years' daily clinical usage and extensive laboratory study, has an adequate estimate of the value of emetine been reached. Though coeseine undoubtedly is of value in amoebiasis, and there have been many optimistic reports on its prolonged studies, both laboratory and clinical, are necessary for its proper assessment. Early impressions gained from the cure of, or improvement in cases of amoebiasis treated with coeseine alone are insufficient.

Amoebae only grow freely in culture media which are in part solid and in part fluid; that most employed consists of a coagulated horse serum slope covered with a mixture of seven parts Ringer solution and one part horse serum, to which is added rice starch. Chemical compounds added to this medium are distributed unequally between the fluid and solid constituents (this was shown by Lakshmi Dobell and Bishop some 20 years ago to be the case with emetine). They found emetine when added to the liquid component of the medium, in some days to be reduced in amount by as much as 80 per cent. As a result they recommended that in assessing the value of speculative compounds with such a medium emetine should be used as a basis for comparison. Composite media have been discarded in favour of liquid media for the examination of drugs, in spite of the inferiority of these in promoting growth of the amoebae. Jones using liquid media, showed amoebae to be 10 to 50 times as susceptible to emetine in an alkaline as in an acid solution. He found that emetine added to a culture immediately before sowing inhibited growth in concentrations of between 1/1 000 000 and 1/5 000 000 in an alkaline medium and between 1/100 000 and 1/500 000 in an acid medium. If however the emetine were added to an established culture of amoebae concentration of 1/50 000 was necessary to kill it in five days (this is "true lethal action"). The figures in the literature for coeseine are less precise but they indicate that coeseine is anything from 4 to 140 times as active as amoebicidal as emetine *in vitro*.

The authors consider that figures for amoebicidal concentration of a drug obtained by using purely liquid media are unduly favourable to the compounds tested, as the amoebae are not growing, under optimum conditions of culture. For this reason they prefer composite solid and fluid media in spite of the uncertainty as to the drug concentration in such media. After trial, a technique for determination of the effective concentration of the added drug in the medium based on that of Macgregor and Laisant was adopted. Briefly this consists of precipitation by an excess of nitro-tungstic acid of the alkaloids in an acid medium and their removal by centrifugation. Titanic chloride is added to the supernatant fluid and the resultant blue colour can be used for a

colorimetric estimation of unaltered silico-tungstic acid in the supernatant fluid, the amount of alkaloid can thus be calculated. Estimations with this technique of known concentrations of the hydrochlorides of conessine or of emetine in aqueous solution proved satisfactory. In sterile liquid culture media there is an apparent loss of the drug which increases with time, and is greater in the case of conessine than in that of emetine, the loss is possibly due to fixation or to destruction of the compounds. In mixed solid and liquid media, on the other hand, though the loss is even greater than in purely fluid media the recoverable amounts of the two alkaloids are about equal.

Two methods of determining the amoebicidal concentrations of conessine and of emetine *in vitro* were used. In the first the drug was added to the tubes immediately before infection, and they were examined after four days, in the second the drug was added to a four-day-old culture of amoebae, and the tubes were examined 24 hours later. Two strains of *Entamoeba histolytica* were employed, the first (Strain P) was obtained from a patient from Réunion, and had been maintained in culture only for a few weeks, the other (Strain M) had been maintained in culture for several years. Three tubes of each dilution of the drug under examination were put up in each experiment, together with controls, the parasites were studied microscopically for their general morphology and motility, and the ratio of dead to living organisms was determined. The results of experiments, with a mixed solid and fluid medium, are summarized in the following table —

Strain	Dilutions causing inhibition of cultures at time of sowing		Dilutions killing 4-day cultures in 24 hours	
	Conessine	Emetine	Conessine	Emetine
Strain P	59 000	240 000	5,300	3,800
	to 71,000	to 300 000	to 7,100	to 4,800
Strain M	45 000	210 000	4,100	2,850
	to 52,000	to 260 000	to 5,350	to 3,450

From these figures it is concluded that Strain M is rather more resistant than Strain P to both drugs. The determined lethal concentrations of emetine added at the time of sowing the medium agree with those reached by previous workers, bearing in mind that at the start the pH of the culture tubes was 7.3 and that this changed to 6.8 in several hours and remained below 7.0, the lethal concentrations of conessine under the same conditions were found to be about four times as high as those of emetine, thus conessine proved only a quarter as effective as emetine when added to cultures of amoebae at the time of sowing. In experiments in which established cultures of amoebae were used, and in which the "true lethal action" of the drugs was revealed, conessine proved slightly more potent than emetine. While it is not possible to draw conclusions as to the therapeutic efficiency of the drugs from these results, it may be remembered that although four times as much conessine is necessary to produce the same effect *in vitro* the therapeutic dosage of conessine at present employed is at least five times as great as that of emetine.

Some studies were made on the elimination of conessine in those treated with a therapeutic dosage of the drug.

Faeces.—A satisfactory technique, basically similar to that already mentioned, was elaborated for the estimation of the alkaloidal content of

faecal suspensions. Analysis of stools from 15 patients undergoing a standard course of treatment with coneosine failed to reveal the presence of the alkaloid in any specimen, even when a sample as large as 10 gm. of stool was examined. The inference is that the drug is destroyed or much more probably absorbed from the intestine in which case it should be recoverable from the urine.

Urine—DUBREUX, TREVORA, TANGUY, ROBIN and KACLET [this Bulletin 1948 v. 45 808] found that up to 140 mgm. of coneosine was excreted in the urine daily by those undergoing treatment for amoebiasis; they found the urinary excretion of the drug to be slow and erratic. The technique for estimation they employed (a nephelometric method with Mayer's reagent) on re-examination gave inconstant results, and so estimations were made of the alkaloidal content of ether extracts of urine with the technique already outlined: this method was found to give consistent and accurate results. Curves are given of the urinary excretion of coneosine by three patients taking 0.5 gm. of the drug daily for six days, and by a volunteer taking 0.5 gm. daily for seven days and then 0.3 gm. daily for six more days. The drug was not found to cause diuresis. In the first three cases the maximum urinary excretion of the drug in 4 hours was 42 mgm. about the fifth day, a figure considerably below that recorded by the above-mentioned workers. On ceasing oral administration of the drug, the excretion in urine rapidly fell, although in one case there was a brief paradoxical rise towards the eighth day; thereafter the excretion diminished until by the 15th day it ceased.

In the fourth subject who was on a more prolonged dosage the curve of excretion was similar and, again, excretion continued for ten days after cessation of the treatment. The gross amount of drug excreted in the urine by any of these patients was less than 10 per cent. of that administered: the balance of the drug was therefore either destroyed or faecal.

It proved impossible to determine the blood levels of coneosine as the amounts were so small. After addition of coneosine to uncoagulated blood and incubation for some hours it was possible to recover all the drug added and this was found to be equally divided between the plasma and the cellular constituents.

A. R. D. ADAMS

McVAY L. V. LAIRD R. L. & SPRUNT D. H. A Preliminary Report of the Successful Treatment of Amoebiasis with Aureomycin. *Science* 1949 June 10 590-91

The treatment of amoebiasis with the drugs currently used is unsatisfactory and involves the risk of toxic reactions. Aureomycin hydrochloride treatment had been noticed to alter the stools and to reduce their content of bacterial flora, so three microscopically proven cases of intestinal infection with *Entamoeba histolytica* were treated with a gross dosage of from 19 gm. to 22.7 gm. of the drug. The blood levels estimated in two of the cases were 8 μ gm. per cent. In all three cases the parasites vanished from the stool within a few days and subsequent examinations by wet and by stained films and by culture on 6 to 14 occasions failed to show a recurrence. Another 11 cases of amoebiasis have similarly since been successfully treated. The amoebae from the first three cases were cultured on Nelson's egg yolk alcoholic extract medium (this Bulletin 1948 v. 45 179) and aureomycin was added to the overlay of soil culture tubes in concentrations of from 0 to 3 mgm. per ml. The tubes were examined 6, 18 and 48 hours later. A concentration above 0.8 mgm. per ml. of aureomycin killed all amoebae in six hours: the majority of the amoebae were killed by 0.1 and by 0.4 mgm. per ml. in 18 hours; no amoebae survived the lowest concentration (0.2 mgm. per ml.) for 48 hours. It is suggested that

the high blood levels reached in aureomycin treatment may render the drug effective in extra-intestinal amoebic infection as well as in cases of purely intestinal infection
A R D Adams

CAMBIES Nouvelle méthode de traitement de la dysenterie amibienne et de la lambliaose intestinale [A New Form of Treatment for Amoebic Dysentery and Giardiasis] *Bull Acad Nat Méd* 1949, v 133, Nos 15/16, 348-50

Lambliasis and amoebiasis are commonly found to occur concurrently, both in those infected overseas and in those infected in metropolitan France. Their presence should be suspected in ill-defined cases of intestinal or of gall-bladder upset. The amoebae normally inhabit, in particular, the upper and the lowermost parts of the large intestine. *Giardia* occurs in the duodenum, the ileum, the gall bladder and the liver. The classical treatments for these infections produce inconstant results, and a suitable therapeutic agent would be a non-toxic drug for oral administration which is parasitocidal to both organisms and is concentrated in the liver and excreted in the bile. "Le dérivé disodique de l'acide (3' 5', 3" 5" tétraodo 4' 4" dioxy triphényl-carbinol) carboxylique 2" [the disodium derivative of 3' 3' 5' 5' -tetraodo-4' 4' -dihydroxy-triphenyl carbinol-2" carboxylic acid] appears to fulfil these conditions. Administration of this compound to a total of 12 gm, given in cachets in three doses over a period of 36 hours, to some 300 patients since 1944 has shown it to be effective in eradicating *Giardia* and amoebic infestations, further details are to be published
A R D Adams

TORGERSEN, O Balantidium-dysentery [Balantidial Dysentery] *Nordisk Med* 1949, July 29, v 42, No 30, 1271-3, 4 figs

The English summary appended to the paper is as follows —

"A 60-year-old farmer's wife suffered for four months from severe diarrhea. Blood was occasionally detected in the stools, but bacteriologic and serologic examinations were negative. Microscopy of the feces was performed once only, the result being negative. Examinations of the gastric contents revealed achlorhydria. The patient's general condition grew worse, and there appeared signs of severe anemia, and finally a clinical picture resembling pellagra. Autopsy revealed thrombosis of the right femoral vein, pulmonary embolism, fatty degeneration of the liver and of the renal tubules, degenerated myocardial fibers and severe colitis with multiple small ulcers and petechial hemorrhages. Numerous trophozoites of *Balantidium coli* were found in the vicinity of the ulcers. The present case is the fourth reported in Norway."

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

KONITZER, L Relapsing Fever in Ambulatory Practice *Acta Med Orientalia* 1949, Mar-Apr, v 8, Nos 3/4, 48-53 [13 refs]

A review of 26 cases of relapsing fever, all in adult Arabs in Palestine, in which smears of the peripheral blood were positive. With one exception these were thought to be caused by tick infection and the patients gave a history of having slept in the open-air or in caves, the one exception was almost certainly louse-borne.

The author recommends (1) routine examination of thick and thin films stained with Giemsa's stain and (2) careful taking of histories, in all cases of
(1289)

pyrexia. As regards (1) it may be noted that spirochaetes were found on routine examination of thin films in four instances only and that the blood was often positive during apyrexial periods. Penicillin as a therapeutic measure was considered to be too expensive and not practicable in out patient cases. treatment with arsenicals was given in the form of carbarsone by mouth, 0.75 gm. daily for five days or neocarphenamine intravenously (0.01 gm. per kilo body weight) the latter being preferred when atabrin (mepacrine) is given simultaneously. Treatment should be given irrespective of the state of the temperature [The reviewer in his experience of the African type of relapsing fever agrees with this.] Iritis and iridocyclitis were not met with in this series. No mention is made of the type of tick incriminated. C. F. Shotton

BORRIS H. Deux années de recherches sur les spirochètes récurrents à l'Institut Pasteur de Dakar [Two Years of Research on Relapsing Fever Spirochaetes at the Pasteur Institute, Dakar] *Bull. M. d. l'Afrique Occidentale Française* 1948, v 5 No. 1 173-91

A general summary written with the object of presenting a clear picture of the epidemiology of relapsing fever with special reference to work carried out at the Pasteur Institute, Dakar. The small mammals of the district are well known to act as reservoirs of the infection and details are given of the results of one year's examination of 517 rodents and insectivores captured in the town of Dakar during the year 26th September 1946, to 23th September 1947.

Species of mammal	Number examined	Infected		Blood film +	Blood sm. +	Bran. sm. +	Spleen sm. +
		Number	Per cent age				
<i>Cricetomys gambianus</i> us	68	33	80.84	1	18	54	33
<i>Arvicola rufinus</i>	14	11	78.57	4	9	11	9
<i>Rattus alex. alexandri</i>	343	129	34.64	10	57	117	74
<i>Rattus norvegicus</i>	37	8	21.62	1	8	8	6
<i>Rattus rattus</i>	40	6	15.00	0	3	5	6
<i>Urotrichus conchus</i>	1	1	—	0	1	1	1
<i>Taloromys gambianus</i>	1	0	—	0	0	0	0
<i>Mus musculus</i>	6	0	—	0	0	0	0
Hedgehog		2	—	0	1		1
Totals	51	203	39.61	16	85	194	132
				3.1	16.35	37.47	25.78

In view of their habits the two most serious carriers of the infection are considered to be *Cricetomys gambianus* and *Rattus alex. alexandri* us.

During 1946 and 1947 a total of 97 cases of relapsing fever were noted, comprising 58 Europeans and 34 Africans. The great majority of these cases (79) occurred in the European part of the town generally known as Dakar, only 13 cases occurred in the native town Médina. The prevalence of infected rodents in the two districts is very similar and the difference in the rate of human cases would seem to be the result of Dakar having a much more favourable soil for the construction of burrows in which the transmitting host *Ornithodoros erraticus* finds suitable conditions for survival. To combat the disease therefore it is desirable to search for all animal burrows and treat them with chloroform followed by topping up the holes.

The second part of this paper is devoted to a consideration of the transmission of relapsing fever spirochaetes by *Ornithodoros* and by lice

It is well known that *S. hispanica* is transmitted in nature by *Ornithodoros erraticus*. Experiments with lice have given conflicting results but the author obtained transmission in two cases by the inoculation of the contents of infected lice into monkeys and white mice. The spirochaetes, after being ingested by lice, soon become non-motile and disappear, but reappear on the 12th day and persist up to the 24th day after an infective meal. The contents of these lice are infective from the 5th day, indicating the presence of a non-spirochaetal stage of the organism since spirochaetes as such only re-appear on the 12th day. All lice do not become infected when fed on relapsing fever cases, but it is suggested that this is the result of the blood containing too few spirochaetes.

The transmission of *S. duttoni*, var *crocidurae* is next considered and the author gives details of five experiments carried out with this organism. In three cases the spirochaete was transmitted by *Ornithodoros* but not by lice. In two later cases, however, white mice were infected by the inoculation of the contents of lice that had been fed on the blood of a monkey containing numerous spirochaetes and subsequently maintained on normal human blood. The contents of the lice first became positive six days after the infected meal, and remained infective up to the 26th day.

It is evident that the experimental transmission of both *S. hispanica* and *S. duttoni* var *crocidurae* by means of lice is possible, and the problem arises whether such transmission ever occurs in nature. During 1948, the author investigated about 40 cases of louse-borne relapsing fever at Zinder, in the Niger Territory, where an epidemic started in April, 1947. Four young monkeys were successfully infected by intraperitoneal inoculation of blood from patients during the first attack. Newly born white rats and mice were also infected but relapses were never observed and the author was unable to repeat the results of BALTAZARD *et al* [see this *Bulletin*, 1947, v 44, 905] with newly-born rabbits.

Finally the author discusses the epidemiology of louse-borne relapsing fever (*S. recurrentis*). Up to now no animal reservoir has been found, but it is difficult to accept the view that man is the reservoir, and lice can also be excluded, for the infection is not hereditary.

In view of the fact that at least five strains of spirochaetes (*S. hispanica*, *S. microti*, *S. turicatae*, *S. hermsi* and *S. duttoni* var *crocidurae*), normally transmitted by ticks, have been transmitted experimentally by means of lice, it is reasonable to assume that other strains may be equally labile. The long intervals between epidemics of *S. recurrentis* could most easily be explained by assuming the existence of animal reservoirs (small mammals and ticks), but hitherto no tick has been found infected with this strain.

E Hindle

BOIRON, H. Quelques considérations sur la fièvre récurrente à tiques dakaroise [Some Observations on Tick-borne Relapsing Fever in Dakar] *Bull Soc Path Exot* 1949, v 42, Nos 1/2, 13-15

— Considérations sur la fièvre récurrente à tiques au Sénégal. L'importance du rat comme réservoir de virus [Observations on Tick-borne Relapsing Fever in Senegal. The Importance of the Rat as a Reservoir of Infection.] *Ibid* 62-70 [33 refs]

The contents of both these papers are contained in the author's previous publication noticed above.

E Hindle

BOREKOV H. Transmission par le pou de *Spirochaeta duttoni* var. *crocidurae*.
[The Transmission of *Spirochaeta duttoni* var. *crocidurae* by the Louse.]
Bull. Soc. Path. Exot. 1949 v 42, No. 3 4 81-3.

The author infected white mice by the inoculation of an emulsion of lice 6 to 14 days after the lice had been fed on a baboon containing in its blood three spirochaetes per microscopic field. These lice had subsequently been fed on a non immune human subject who showed no signs of infection as a result of their bites even though the insects contained infective spirochaetes. [These results confirm those previously recorded by MATTHEWS (*this Bulletin* 1928, v 3 588) and HEISCHE & GARNHAM (*ibid* 1944 v 45 603)] E. Hinde

DELFT L. P. Au sujet de *Spirochaeta microti* Rafy, 1948. [Concerning *Spirochaeta microti* Rafy, 1948.] *Bull. Soc. Path. Exot.* 1949 v 42, No. 5/6, 147-8.

A brief summary of information concerning this spirochaete which was first recorded by RAFY in the blood of a *Meriones* in the neighbourhood of Hemsarek [*this Bulletin* 1947 v 44 87]. ROCHASNIOT subsequently isolated a spirochaete from the blood of *Tatera indica* caught in the same district which seems to be the same species.

The author states that his colleague R. MAUNOURT, during the past two years, has found that 35 per cent. of the *Tatera* in this district are infected, 40.4 per cent. of the *Meriones* and 14.8 per cent. of the hamsters. (See below.) The numerous strains all have the essential characters of *S. microti*. E. Hinde

RAFY A. & MAGNANI, G. R. Recherches sur l'infection expérimentale des rongeurs par *S. microti* Rafy 1948. [Researches on the Experimental Infection of Rodents with *S. microti* Rafy 1948.] *Bull. Soc. Path. Exot.* 1949 v 42, No. 5/6 215-1.

In the neighbourhood of Hemsarek the following species of wild rodents have been found naturally infected with *Spirochaeta microti* —

Rodent	Percentage infected			
	1946	1947	1948	Average
<i>Meriones persicus</i>	—	30	30.7	40.4
<i>Tatera indica</i>	—	20	30	35.0
<i>Neotoma indica</i>	0	35.4	0	1.1
<i>Mus musculus</i>	18.7	0	0	5.5
<i>Cricetus orientalis</i>	19.7	3	0	14.4

Three of these strains, one from *Mus musculus* and the other two from hamsters, were selected, as they showed different degrees of virulence in white rats, that from the mouse (S2) being little pathogenic while one of the hamster strains (S1) was moderately pathogenic and the other (S3) fully virulent.

The strain S1 gave immunity against strains S1 and S2 and slight protection against S3. Strain S2 protected against S2 and S1. Strain S3 conferred protection only against the same strain.

All the ordinary laboratory rodents including rabbits, guinea-pigs, rats, mice and hamsters were found to be susceptible. The white rabbit and guinea-pig showed no obvious signs of infection and usually spirochaetes were not found, yet the blood remained infective to white rats for long periods. Blood was

infective for white rats up to 100 days in the case of the guineapig. The absence of any reaction in adult guineapigs provides an easy method of distinguishing *S. microti* from *S. persica*, in the latter the infection produces definite febrile attacks with spirochaetes in the blood. Young animals were found to be very susceptible to *S. microti* and showed numerous spirochaetes in the blood and in the case of young rabbits sometimes died with signs of haemorrhagic jaundice.

White rats are very susceptible. With a mildly virulent strain, a benign infection is produced (1 spirochaete to 100 fields in the blood) but the virulent strains produce a mortality of 60 to 70 per cent. The incubation period is 1 to 4 days and the animals generally succumb on the fourth to seventh day of the disease with numerous spirochaetes in the blood. Splenectomy renders the white rat much more susceptible and even mildly virulent strains produce fatal infections.

Sheep and dogs were found to be slightly susceptible, showing either a latent or benign infection.

One of the authors became accidentally infected with this spirochaete after a probable incubation period of about 25 days. The infection lasted a month with three febrile attacks (up to 104.2°F) each of 2 to 3 days, separated by intervals of 10 to 12 days. During the febrile attacks, there were rare spirochaetes in the blood, with general symptoms such as headache, pains in the joints, and gastric disturbances. Treatment with neoarsphenamine after the third attack was followed by complete recovery.

Residual infections remain in apparently recovered animals, the brain of the guineapig being still infective 593 days after the original infection.

In nature *S. microti* is usually transmitted by *Ornithodoros erraticus*, in which the infection is hereditary, and more rarely by *O. tholozani*. Experimentally the infection has been transmitted by the bites of *O. lahorensis* and *O. canestrinii*, and by inoculation of the contents of *Argas persicus*. The spirochaete retains its virulence at least 360 days in *O. lahorensis* and 731 days in *O. canestrinii*.

In the discussion following the paper M. COLAS-BELCOUR stated that the spirochaete referred to as *S. laterae* by Rousselot and Rafin-Duvolon, had the same general characters as *S. microti*.

E. Hundle

YAWS

MONTEL, M. L. R. Le pian tertiaire maladie sociale (en Indochine) [Secondary Yaws as a Social Disease in Indo-China] *Bull. Soc. Path. Exot.* 1949, v 42, Nos 5/6, 210-15, 12 figs. on 6 pls.

The term "tertiary yaws", including certain tertiary lesions which encroach upon the secondary stage, is convenient and justified by analogy with the evolution of syphilis. Tertiary yaws is characterized by chronic nodular, ulcerative and gummatous lesions of the skin, bones, periosteum and joints. *Treponema pertenue* is nearly always absent from them. The tertiary stage suggests a sensitization of the body, and histologically the lesions have a tuberculoid character. Not all yaws cases develop tertiary lesions, for in many the condition is cured after the secondary stage, if not serologically at least clinically, and the patient appears normal. This arrest is most frequent in well-nourished and prosperous populations. Where chronic famine prevails, tertiary lesions are frequent and grave.

Lesions of the tertiary stage which encroach on the secondary are (a) palmar and plantar hyperkeratoses of various forms (punctate, fissured, trichophytoid,

desquamating, verrucous or "worm-eaten") which are only the eruption of secondary lesions (raised circular desquamations, pemphigus or fissured pianomes) progressively transformed and organized by hyperkeratosis. (b) Osteo-periosteal lesions of the fingers and toes, a *yaws spina-tendosa* which are often seen in the secondary stage and yet have undoubted characters of tertiary lesions. (The reviewer believes that the characteristic of tertiary lesions is tissue destruction which these borderline lesions probably lack.)

True tertiary yaws lesions begin 7-10 years after the onset of the disease and rarely later. — () Ulcers starting as cutaneous or subcutaneous gummata which break down and spread peripherally. They may involve underlying bones. Sometimes while the lesion is extending, parts of it may be healing. Keloids may be formed. Tenosynovitis and synovitis are not unusual in this stage. (b) Osteo-periosteal and articular lesions with periosteal diaphysal thickening and osteal and subperiosteal gummata with condensation of bone round the lesions, and occasionally obliteration of the medullary canal. Bone lesions may frequently cause sabre tibia. Gummata may ulcerate and give rise to prolonged suppuration and scarring with contractures. The epiphyses and articular parts are less frequently involved than the diaphyses except for osteoporosis. No spontaneous fractures were seen by the author. When tertiary lesions are widespread, profound and sometimes fatal cachexia may be produced. Such widespread lesions are not seen in syphilis. (c) Deformities and contractures resulting from scarring produce permanent disability and atrophy especially of the limbs and are very characteristic of healed tertiary yaws. It is these which have caused the author to call yaws a social disease. Certain lesions may result in patchy depigmentation and atrophy of the skin. (d) Gangosa is not frequent in Indochina, but juxta-articular nodules are. The author has not seen gonodon in Indochina. Leuco-erythroderma and hyperkeratosis of the skin, palms and soles are of the same stage as juxta-articular nodules (but no further description is given in this article).

(The importance of yaws as a cause of suffering in a community is not generally recognized. The misery of tertiary yaws of a few years standing is specially stressed by the author.)

C. J. Hackitt

LEPTOSA

NAKAMURA, H. Studies on Cultivation of the Leptocy Bacillus. *Haver Med J* 1949 Mar.-Apr. v 8, No 4 265-8.

This paper is of interest owing to the care taken to avoid the difficulty of determining if the enormous number of lepra bacilli usually introduced into culture media have really multiplied or not. In the present experiment after a second centrifugation of the leprosy material the supernatant fluid which was added to the medium contained only 1.3 bacilli per macroscopic field. The medium contained small percentages of macein 0.4 per cent, soluble starch 0.2-0.4 per cent., glycerin 2.0 per cent, malachal green 0.001 per cent dissolved in distilled water and 5.0 per cent of human or ox serum added immediately before use. The following additional ingredients were also shown to be favourable to growth: phibicol 1% vitamin B₁ 17-4% and vitamin B₂ 17-4% per cc. of culture media. The cultures were incubated at 37°C. for 3 days, at 25°C. for three days, and so on repeatedly. After four or more weeks stained films showed a definite picture of multiplication of the organisms of either human or of rat leprosy in accordance with the inoculum. Subcultures

at six to eight weeks with one drop of a culture produced conglomerations of organisms in a stained film in the case of the rat leprosy bacillus repeatedly and occasionally with the human organism, with the former bacillus rats were successfully inoculated with cultures of the first generation *L Rogers*

VEGAS, M, CONVIT, J & ESPIN, J **Studies on the Reticulum in the Different Types of Leprosy** *Internat J Leprosy* 1948, Oct-Dec, v 16, No 4, 443-50, 8 figs on 2 pls

Reticular fibres can be differentiated from collagen fibres by being profusely anastomosed and they are stained dark brown or black by colloidal silver, while collagen becomes yellowish. Reticulum may be produced from fibroblasts, reticulo-endothelial cells and from blood capillaries. Reticular fibres are arranged about vacuolated cells of Virchow in leprosy. Forty specimens of neural and lepromatous types have been studied with the following results. The reticular formation is a tridimensional network surrounding the granulomatous cells in the inflammatory reaction zones of the simple macular lesions, and grows complex in lepromatous lesions and in tuberculoid lesions and they play an active part in the defensive processes against the leprosy bacillus

L Rogers

CASTAÑE DECOUD, A **Comparative Study of the Nerve Branches of the Skin in Tuberculoid and Lepromatous Leprosy** *Internat J Leprosy* 1948, Oct-Dec, v 16, No 4, 451-8, 7 figs on 2 pls

Nerve injury is more serious in tuberculoid than in lepromatous leprosy, but can be demonstrated in both forms. A histological analysis has been made in a series of skin sections from six cases of each form of all nerve branches and of lepra bacilli in them with the following results, which are shown in two tables, and illustrated by plates. In the tuberculoid form infiltration with destruction of the nerves is the characteristic change and in the lepromatous variety infiltration and the frequent presence of the bacilli predominated. Nerve branches are more frequently found in the lepromatous variety. The greater number of bacilli with less destruction of the nerves in lepromatous lesions indicates that in the tuberculoid cases the nerve destruction is due to an allergic reaction. The lesions described are well shown in the illustrations

L Rogers

ALVAREZ LOWELL, L, PUCHOL, J R & RODRIGUEZ PEREZ, A P **Aportación al conocimiento histopatológico sistema nervioso periférico en la lepra [Contribution on the Pathological Histology of the Peripheral Nervous System in Leprosy]** *Internat J Leprosy* 1948, Oct-Dec, v 16, No 4, 459-64, 16 figs on 5 pls

The changes described were based on complete autopsies of two patients dying from the lepromatous form of the disease, and biopsy specimens of five leprosy patients of different types and in different stages. The changes are described as they occurred in the spinal ganglia, the peripheral nerve trunks and the nerve endings. Each of these is described minutely and illustrated by photomicrographs. In the ganglia appear cells, some swollen and enlarged, others staining badly and obviously degenerating, the capsules are swollen but in no case was there any proliferation of the connective tissue. There was, however, some proliferation of endocapsular glia cells, certain of the cells showed hyperpigmented masses, but no neurofibrillar structure could be made out, merely irregularities in the reticulum. The cells were much

of the nodules ensued with eventual disappearance leaving deep scars with or without discharge from the nodules in some and small fine scars in others. From two to several injections were required to destroy nodules completely. Of 51 nodules on the ear 4 were destroyed through expulsion of their contents and 7 were reduced in size. Only 7 scars could be regarded as unaesthetic. In a total of 30 cases the nodules were completely cleared up in 20 although they had previously resisted promin intravenously for 12 to 30 months. In the other 10 only partial success was obtained. Macules and plaques are present in too large numbers for this treatment owing to the intense pain and blisters resulting from the caustic nature of the drug.

L. Rogers

Row R. On the Experimental Transmission of Rat Leprosy in the Mouse with the Culture of *Mycobacterium Steadwelli* Isolated by Symbiosis. *Indian Physician*, 1949 June v 8 No. 6 145-P 2 pls.

After reference to his previous paper on the cultivation of the bacilli of leprosy and of rat leprosy by symbiosis [see this *Bulletin* 1949 v 48 264] the author records a single experiment of inoculation of a mouse intraperitoneally with rat leprosy material. When the mouse was killed after five months the liver and spleen were much enlarged and studded uniformly with pin-head granulomata containing globi and numerous acid-fast long bacilli which were cultivated by the author a method on glycerinated potato. This culture produced similar appearances when injected into a second mouse.

L. Rogers

HELMINTHIASIS

GÄRTNER, H & MÜTTE, Lieselotte. Beitrag zur Verbreitung der Wurmkrankheiten. [On the Spread of Helminthiasis.] *Deut med Woch.* 1949 July 15 v 74 Nos. 27/28 831-3. 18 refs.]

Helminthic infestation seems to have been increasing in Germany in recent years. Even before the war it was fairly high. From East Prussia in 1892 came records of 74 per cent *Ascaris* and 53 per cent *Trichuris* infestation. In Kiel in 1936 a general infestation of 4-6 per cent with 78 per cent *Trichuris* and 28-3 per cent *Ascaris*. Outside Germany also incidence was high, in Italy Switzerland and Russia between 30 and 40 per cent in 1943 between 31 and 55 per cent in Italy in 1922 27 between 29 and 50 per cent in Russia. (These are given as general figures of worm infestation but they cannot surely apply to the whole of these countries.) The first-named author (Gärtner) in 1943 examined in France Frenchmen employed in German kitchens and found 16 per cent infested among Germans similarly employed only 7.1 per cent. In Russia more than 30 per cent.

In Darmstadt after the war helminthiasis was very rife. 77.5 per cent of those examined (number not stated) were infested, the main source being it appears, vegetables and fruit (strawberries) grown on irrigated soil, untreated waste-water being used for the irrigation. The authors examined 1044 persons the stools of 1040 and anal smears of 152. Of 783 faecal samples sent in to the Hygiene Institut 496 (63.3 per cent) were positive. *Ascaris* in 761 (77.8) and *Enterob* in 578 (73.8). *Trichuris* 23 (4.8) and *Taenia* 8 (1.6). Thirty were examined from the kindergarten. 1 stool used *Enterob* 3 *Ascaris* and 3 had both. Of 46 anal smears from the Children's Clinic *Enterobium* was found in 41. One hundred and twenty-three young girls between 20 and 23 years of age at High Schools with hygienic conditions above the average had their faeces examined and 73.59 per cent were positive. 43

with *Enterobius*, 23 with double infestation and 7 with *Ascaris* alone, in 65 out of 104 the anal smear was positive. Of 82 workers in the irrigated fields 65 were positive. The irrigation water was examined, two samples being taken in the morning, at midday and in the evening and the average number of *Ascaris* ova found was 530 per cc, the extremes being 464 and 568. Since the accepted length of life of *Ascaris* ova in soil is 5 years, those working in these fields irrigated with untreated water are in perpetual danger of infestation.

H Harold Scott

ALBORNOZ PLATA, A. El examen coprológico. Valorización estadística del método de concentración sobre el método directo [Faecal Examination Statistical Evaluation of Concentration as compared with Direct Examination] *Prensa Méd Argentina* 1949, May 27, v 36, No 21, 944-6

The author has compared the results of direct examination of the faeces and a concentration method which he calls the American Armada [this is not defined] in 88 children, 8-16 years of age, in Bogotá, Colombia. He determined the percentage coefficient of infestation by *Ascaris*, *Trichuris*, *Giardia* and hookworm, and shows how much more satisfactory the concentration method is. Thus, the direct coefficients were 22.6, 53.4, 17.7 and 10.2 per cent respectively, whereas those by concentration were 39.8, 69.2, 20.5 and 17.0.

He concludes that a negative direct examination is valueless, a positive has a qualitative, but not a reliable quantitative, value, and, secondly that concentration methods should be used in all laboratories. [He might add that, for purposes of inter-laboratory comparison, one particular concentration method should be agreed upon.]

H Harold Scott

RAVELLI, A. Zum röntgenologischen Erscheinungsbild höherer tierischer Parasiten in der Lunge des Menschen [X-Ray Appearances of the Higher Animal Parasites in the Human Lung] *Med Klin* 1949, May 13, v 44, No 19, 603-6 [Numerous refs.]

In the author's view X-rays of the lungs can be of considerable help in the diagnosis of certain worms and arthropods. He describes the appearances in the following 7 infestations —

1 *Schistosomiasis* — In the acute state milky shadows, of the size of millet seeds, distinguished from tuberculosis because the apices are free, later the shadows are larger, to the size of a pea or even bean.

2 *Paragonimiasis* — Extensive diffuse bronchiectasis with shadows about 8-10 times as large as a pin's head.

3 *Cysticercosis* — Small opacities up to 4 mm, rounded or oval, umbilicated. Extrapulmonary cysticerci, calcified and uncalcified, may be seen.

4 *Echinococcus cyst* — Usually solitary, varying greatly in size from that of a pea to that of a human head, mostly homogeneous. The *Ablösungsphänomenon* may be seen — a clear half-moon zone due to the presence of air between the cyst and the lung tissue at the upper pole of the cyst, or the symptom which the author calls *Kopfsteinpflaster*, in which the daughter-cysts floating in the mother-cyst produce an undulating borderline.

5 *Echinococcus alveolaris* — Coin-like shadows, from a pea to a walnut in size, with clear-cut but irregular borders.

6 *Pentastomiasis* — Usually subpleural in position, the size of a pea, kidney-shaped non-homogeneous opacities with a clear-cut edge. The larva may or may not be calcified.

7 *Porocephalasis* — Opacities millet-seed in size and trapezoid in shape, with double-contoured rings and typical segmentation. Extrapulmonary calcified forms may be seen.

H Harold Scott

CALDERÓN RODRÍGUEZ, Judith. Algunos datos sobre antihelmínticos intestinales. [On Intestinal Anthelmintics.] *Rev. Kuba Med. Trop. y Parasit.* 1949 Mar.-Apr., v 5 Nos. 3,4 41-7 [Bibliography]

A useful summary of the subject. In fact it seems to have been a lecture delivered to the Parasitological Section of the National School of Biological Science, Mexico. The author notes first the difference between vermifuges and vermicides and then divides active anthelmintics into four groups: 1. Crude drugs as used by indigenous populations. 2. Refined or partially refined products of these. 3. Active principles of them, isolated and purified. 4. Synthetic products.

Various drugs—male fern, pomegranate, pumpkin seeds, pelletierine and terpenes, antimony, chenopodium and avaricidol, phenols (thymol, resorcin, hexyresorcinol), gentian violet, carbon tetrachloride and tetrachlorethylene and others—each receive a few words on their doses and special uses. A bibliography of nearly 60 titles is appended to the paper. *II Harold Scott*

DE AZEVEDO J. F., DA SILVA, J. B., COTTO A. DE M., COELHO M. F. & COLAÇO A. O foro português de schistosomíase. [The Focus of Schistosomiasis in Portugal.] *An. Inst. Med. Trop. Lisbon.* 1949 Dec., v 5, 175-222, 20 figs. (15 on 6 pls.) (43 refs.) English summary

The discovery recently of two cases of urinary schistosomiasis (*S. haematobium*) in the Province of Algarve at the south-west corner of Portugal led to an intensive study of the endemism of this infestation. The authors have carried out a very thorough investigation and their work and its results are presented in much detail in this paper. They give a history of the disease in Portugal, the first case having been reported from the same district in 1921. Some 10 villages were studied, but in only one, Estoi, was infestation found as recently as 1948. In one other, Estômbar it was found in 1948, and in a third, Marmeleira, in 1942. Molluscs are abundant in the waters of the Province, particularly *Planorbis d. fontis*, many of which were infested; others are *Physa* *acuta* and *Lymnaea stagnalis* but these do not seem to be intermediate hosts. In some of the other villages cases have been observed during the past 20 years and there is every possibility that the infestation may spread to them again since the vectors are numerous and the people infested habitually bathe in local ponds and streams and in irrigation tanks. Experimentally, a *Cercopithecus* monkey was found infectable by cutaneous penetration of the cercariae and also per os and lesions in the intestine and liver resulted, but on no occasion were ova seen in the urine. Much of this paper is taken up with an ecological study of the molluscan vector. One case in a man of 71 years is described fairly fully.

II Harold Scott

PRATES, M. A bilharrose na África Oriental Portuguesa e a sua importância na etiologia dos carcinomas primitivos do fígado dos indígenas. [Schistosomiasis in Portuguese East Africa and its connection with Primary Carcinoma of the Liver.] *An. Inst. Med. Trop. Lisbon.* 1949, Dec., v 5, 149-74, 31 figs. on 10 pls. English summary

Carcinoma of the liver is unduly common among the indigenous population of the Mozambique. It affects even children as young as 10 years of age though more frequent among adults of 20 to 35 years. Early symptoms are a feeling of weight and slight pain in the epigastric region or right hypochondrium; a month or so later swelling appears, often nodular. This is followed by ascites and the fluid may be haemorrhagic; pruritus appears before death. Cachexia is rapid. At autopsy the liver shows one or a mixture of four forms: 1. Great

enlargement, to 8 kgm or even more, with nodules on the surface varying in size from that of a grain of millet to an orange 2 Liver small and made up of hard tumours like a bunch of grapes 3 Often seen in children, liver small and cirrhotic with small nodules, resembling Laennec's cirrhosis 4 One lobe almost entirely replaced by neoplastic tissue, perhaps as large as a "child's head", with a surface smooth in some parts, nodular in others The bile-ducts are free of growth but the portal vein is nearly always dilated and occupied by tumour masses

Seeing appearances so like cirrhosis the author naturally thought of native drinks which are taken freely and are often irritant and contain toxic substances of an aromatic or resinous nature [not specified], but this would not account for many of the cases occurring in children Further investigation revealed that nearly every individual suffered from schistosomiasis (*S haematobium* in this district) and microscopical examination of the liver tissues showed that schistosome ova were present, and the author believes that this infestation is the cause of the primary carcinoma common among these people It was thought that if this were so confirmatory evidence might be obtained by examination of the livers of animals infested with *S bovis* The author therefore obtained material from the slaughter-house and found the same histological changes, indicating malignancy, in the livers of cattle similarly infested Some excellent photographs illustrate the paper

H Harold Scott

DA MOTA, L A C-R C Estudo da acção do gamahexano sobre alguns moluscos portugueses dos géneros *Planorbis*, *Limnaea* e *Physa* [On the Action of Benzene Hexachloride on certain Molluscs of Portugal] *An Inst Med Trop* Lisbon 1948, Dec, v 5, 289-319 English summary

This article is divided into two parts In the first, the author carried out a comparative study of the effect, under laboratory conditions, of BHC and of copper sulphate on *Planorbis dufourii* (the vector of *S haematobium* in Algarve Province), *Limnaea peregra* and *Physa acuta* For the former, he used 10 cc of a solution of a commercial product, L F 140, containing 10 per cent gamma isomer, with 90 cc distilled water and 0.4 cc of Triton X 100 The copper salt was used in a dilution ranging from one in a hundred million to one in a thousand The detailed results are given in tables, but the following epitomizes the results

1 Copper sulphate in a dilution of 1 p.p.m. upwards will kill all three in 24 hours, whereas BHC requires a concentration of 100 p.p.m. to give the same result

2 BHC is more expensive than the copper salt

3 BHC may endanger the life of the higher aquatic fauna and animals using the water

4 *P. dufourii* is more resistant to BHC than are the other two, whereas

5 From a few experiments it would appear that *Planorbis* and *Physa* are both very sensitive to copper sulphate Hence

6 The copper salt is to be preferred for dealing with *P. dufourii*, the local vector of *S haematobium* in Algarve

The second part of the paper deals with the action of BHC on the development of the ova of *P. dufourii*, controls being maintained in water under similar conditions The author found that with concentrations of 0.1 to 0.2 p.p.m. the motility of the embryos was reduced and the hatching period of the eggs lengthened and all embryos died in 3-4 weeks In higher concentrations of 1 to 5 p.p.m. they died in 2 weeks and in 10-20 p.p.m. in one week 0.02 p.p.m. had no effect on the embryos during a period of observation of 35 days "On account of the very high concentration needed to kill the embryo snails we do not consider the use of gammexane practicable for this purpose"

H Harold Scott

COUTINHO J. O. & PRADO, S. B. Sobre um foco autóctone de esquistossomose mansônica em Jacareizinho (norte do estado do Paraná Brasil). (A Focus of *Schistosomiasis mansoni* in Jacareizinho, Paraná.) *Hospital* Rio de Janeiro. 1949 Apr., v 35, No. 4 531-42, 3 figs. & 1 plan. [14 refs.]

Schistosomiasis mansoni has been recorded in Paraná by Pinto and Almeida, but the exact locality was not given. The authors now report finding a focus of infestation in Jacareizinho, a town in the north of the State. They examined the stools of 51 persons and found ova of *S. mansoni* in 20 of them, all young persons below the age of 20 years—the ages ranged between 6 and 18 years and all had been born in the town and had lived in the municipality all their lives. The intradermo-reaction was tried on 68 subjects (including the 20 with ova in their faeces)—19 gave a 3-plus, five a 2-plus, and eight a 1-plus. Eight of those with faeces positive gave a negative skin reaction and the opposite of this was still more frequent—four who gave a 3-plus had negative faeces—three who had a 2-plus and seven who had a 1-plus. The chief focus of infection was the stream Agua Fria near an old reservoir (piacina). *Australorbis glaberrimus* was found in the waters. Unless care is taken there is a danger of the spreading of the infestation beyond this small focus as conditions therefor are favourable.

H. Harold Scott

VITAN SENA, S. C. Chromosomen und Geschlecht bei *Bilharzia mansoni* (Chromosomes and Sex in *Schistosoma mansoni*). Reprinted from *Zeitschr. f. Parasitenk.* 1949 Aug 30 v 33 No. 5, 690-701, 17 figs. [Numerous refs.]

GÖNNERT R. U. ber rudimentär weibliche Geschlechtsanlagen bei *Bilharzia mansoni*-Männchen. (Rudimentary Female Embryos in *Schistosoma mansoni*). *Zeitschr. f. Tropenmed. u. Parasit.* Stuttgart 1949 Aug. 1 v 3, 277-8, 5 figs. [10 refs.]

GUTIÉRREZ AGUAYO C. Precisa estudiar mejor nuestros moluscos de importancia médica. (Need for Closer Study of Molluscs of Medical Importance in Cuba.) *Rev. A. de Med. Trop. y Parasit.* 1949 Mar-Apr v 5, Nos. 3/4 47-50, 3 figs.

The author laments that little (if anything) has been done to gain real knowledge of the molluscan intermediate hosts of the helminthic parasites of his country. *Physa culensis* and *Lymnaea cubensis* are known to be common vectors of *Fasciola hepatica* and *Tropicoeris lemniscatus* and *Australorbis glabratus* of *Schistosoma mansoni*. Photographs of these are very clearly reproduced, drawn to scale.

The author suggests publication of a booklet depicting and describing the chief Cuban sweet water molluscs and indicating their distinctive point for identification—a study of the geographical distribution, experiments to determine which are capable of acting as intermediate hosts, establish malacological and zoonotic indices in as many localities possible and finally to find out the best way of getting rid of potentially noxious ones. (Much useful information might be gained from the carrying out of such a scheme.)

H. Harold Scott

HIDAYAT M. A. Endemic Hepato-Splenic Fibrosis. (Endemic Hepato-Splenomegaly). (Egyptian Splenomegaly). *J. Roy. Egyptian Med. Ass.* 1949 May v 32, No. 5 404-22. 21 refs.

This paper is a concise account of the aetiology, pathology and clinical features of Egyptian splenomegaly with a review of 141 patients who were

subjected to splenectomy in the Kasr el Ain Hospital during 1943. The ages of the patients varied from 10 to 70 years, but 94.3 per cent of them were under 40. There were 120 males and 21 females. The majority came for operation within the first three years of noticing splenic enlargement. All patients showed secondary hypochromic anaemia and it is recommended that operation be postponed until the percentage of haemoglobin has been raised to 70, as in 60 per cent of the post-operative deaths the figure was below this. Schistosome ova were detected in the stools of 26 per cent and in the urine of 10 per cent, if those in whom haematuria and pyuria without ova were present are regarded as probably examples of old schistosome cystitis, then 79 per cent of the whole series were of schistosomal origin. Thorough treatment of this condition before operation is advised. Ova of *Ascaris lumbricoides* were detected in 33 per cent and of *Ancylostoma* in 11 per cent, both of which infections received appropriate treatment. Leucopenia below 2,500 or leucocytosis above 11,000 per cmm should contraindicate splenectomy and an estimation of the number of platelets per cmm is essential, as there is an increased tendency to haemorrhage in patients with thrombocytopenia, or to thrombosis in the portal venous system in those with a high platelet count. In selecting patients for splenectomy preference should be given to those under 40 years of age with a comparatively short history, the risks of operation increase as the cirrhosis of the liver advances and ascites, jaundice or any sign of hepatic insufficiency are absolute contra-indications. The galactose tolerance often fails to detect mild degrees of hepatic insufficiency, other more sensitive tests are therefore recommended, especially the bromsulphthalein clearance test of Rosenthal, provided that jaundice is absent.

Splenectomy was carried out through a long left paramedian incision in the usual manner, if diffuse firm adhesions are met with or the spleen is felt to its bed the author advises that the attempt at removal be abandoned and as much of the pedicle be ligated as can be safely reached. Silk should be used for all ligatures and auto-transfusion of the citrated splenic blood during the operation is advised. The operation mortality was 10 per cent, due to post-operative shock in five cases, spinal shock (after percaïne anaesthesia) in two cases, pneumonia two cases, burst abdomen three cases, cholaemia one case and streptococcal septicaemia one case. Pulmonary collapse and pneumonia occurred in 61 cases (40 per cent), including the two deaths referred to above, various factors probably contribute to this high incidence, such as trauma to the diaphragm during operation and the loss of the support provided by the enlarged spleen (Henry), but the main factor is obstruction of a bronchus by mucus and inability of the patient to expectorate it as a result of weakness or inhibition of the respiratory muscles. Early movements, cough and expectoration should be encouraged and frequent short inhalations of a mixture containing 5 per cent of CO₂ in oxygen after operation are advised. [A follow-up of the survivors, with blood examinations where possible would have added greatly to the value of this analysis.]

W. L. Harnett

COUCEIRO, A. Esplenomegalia esquistosómica gigante. Esplenectomia [Great Enlargement of the Spleen in Schistosomiasis. Splenectomy] *Semana Méd* 1949, July 21, v 56, No 29, 115-29, 2 figs [46 refs]

This article is of the nature of a lecture on splenomegaly, with an illustrative case of a young girl of 17 years who, from the age of 12, began to suffer from pain and swelling in the left hypochondrium. When she came under the author's observation there was little or no pain, but the spleen extended down to the iliac fossa and two fingers' breadth to the right of the middle line. Eosinophiles made up 10 per cent of a total leucocyte count of 4,200 per cmm, in the

laeces were ova of *Isurus lambricoides*, *Incisostoma duxleyi*, and *Schistosoma mansoni*. (The author reproduces a photograph of a man with splenomegaly just like that of the girl in question, because at the time of examining the girl a camera was not available." Splenectomy was decided upon and a photograph of the organ is shown. Its measurements were 21x18x8 cm., weight 2,300 gm. Recovery was uneventful and the patient left hospital in a month.

The remainder of this article is taken up with general text-book matters, such as the physiology of the spleen, enumeration of the causes of splenic enlargement, quotations from and references to the literature on spleen in schistosomiasis, concomitant conditions as regards the blood, urine, liver function, serological reactions and the various reasons for which authors from the beginning of the century have suggested extirpation of the spleen.

11 Harold Scott

ARMBRUST A. de F. Esquistosomose da vesícula biliar (Schistosomiasis of the Gall-bladder. Hospital, Rio de Janeiro, 1949 Apr v 35 No. 4 467-69 13 figs. [40 refs.] English summary.

The author remarks on the rarity of involvement of the gall-bladder in schistosomiasis—35 references to it have been collected by him—and he notes that it has been recorded in a patient in Brazil who had undergone the operation of cholecystectomy. He here records two cases of his own. The patients gave a history of repeated haematemesis and died soon after admission to hospital. Varices were found at the termination of the oesophagus. Microscopical examination of the wall of the gall bladder revealed inflammatory changes and the presence of ova of *S. mansoni*. The pathological changes are well shown in a series of photomicrographs.

11 Harold Scott

JORDING, W. H. The Eradication of Schistosomiasis: a Plea for a Rational Approach to the Problem. *J Trop Med & Hyg* 1949 June 52, No 6, 171-6. [31 refs.]

Much of this paper consists of a review of recent work on mass treatment and methods of snail control, but the author concludes that efforts in these directions are not likely to be effective in control of the disease. The drugs used are not without danger, or are not so satisfactory that reliance can be placed on them, and the methods of snail destruction can hardly be applied on a scale large enough to cope with what is now an immense problem. The author describes a case in which the patient died a few days after completion of a course of intravenous injections of sodium antimony tartrate in which 10.5 grams were given in two days.

The author's plea for a rational approach is based on the failure of treatment and of snail eradication by chemical compounds, to control schistosomiasis and his proposal is that emphasis should be placed on sanitation and education. If proper means for disposal of excreta and refuse were widely available and the people knew the importance of using them properly, not only would infection of snails be averted, but the snails themselves which flourish in contaminated water would be reduced. (The author makes the point that mass treatment is not likely to be successful in eradicating *S. japonicum* because the animal reservoirs are so numerous. It seems likely that this fact would seriously interfere with the success of any scheme of sanitation for the same reason.) Good sanitation of course would exert a favorable effect on many more diseases than schistosomiasis.

Charles H. Woods

HUNTER, G W, SHILLAM, D S, TROTT, O T & HOWELL, E V Jr
Schistosome Dermatitis in Seattle, Washington *J Parasitology* 1949,
 June, v 35, No 3, 250-54, 1 fig [12 refs]

Swimmers' itch was reported in persons who had bathed in Green Lake, Seattle, and the authors investigated the subject there. They collected four species of snails, and found cercariae of *Trichobilharzia ocellata* (= *Cercaria elvae*) in *Stagnicola palustris nuttalliana*, and cercariae of *Trichobilharzia physellae* in *Physella propinqua*. These two snails are recorded as hosts for the first time, but the other two species could not be incriminated. The known intermediate hosts of these schistosomes are set out in a table —

Parasite	Common synonyms	Snail hosts
<i>Trichobilharzia ocellata</i> (La Valette)	<i>Cercaria ocellata</i> , La Valette 1855 <i>C. elvae</i> , Müller 1923 <i>Trichobilharzia kossarewi</i> Skrjabin and Zakharow 1920	<i>Lymnaea stagnalis</i> <i>jugularis</i> , Say <i>L. s. hilliana</i> , Baker <i>L. s. sanctaemariae</i> , Walker <i>Stagnicola palustris</i> <i>elodes</i> , (Say) <i>S. palustris nuttalliana</i> , (Lea)*
<i>Trichobilharzia physellae</i> , (Talbot)	<i>Cercaria physellae</i> , Talbot, 1936 <i>Pseudobilharzia</i> <i>querquedulae</i> McLeod 1937	<i>Physella parkeri</i> (Currier) <i>P. magnalacustris</i> (Baker) <i>P. propinqua</i> , (Tryon)*

*Denotes a new host record

The two species of cercariae were proved capable of causing typical schistosome dermatitis by laboratory experiments. In addition, one investigator who was naturally exposed to infection in Green Lake showed severe allergic symptoms on reinfection about one month later, and one who was infected in the laboratory showed a similar severe allergic reaction after natural exposure 27 days later. Sensitivity can therefore be greatly increased after first exposure, but it is not known how specific this sensitivity is to the different schistosomes.

Charles Wilcocks

SILVER, C P **Hydatid Cyst and Cirrhosis** [Memoranda] *Brit Med J* 1949,
 Aug 20, 423, 1 fig

This case refers to a woman of 68 who was admitted to hospital in Edgware, vomiting blood and in a semi-conscious condition. She had lived all her life in Lancashire and was not an alcoholic. She had had two abdominal operations in early life and a third in 1931. The only notes available stated "laparotomy—hydatid cyst". She had a haematemesis in 1944 and recovered. Despite treatment, she died 36 hours after admission. Autopsy showed evidence of multilobular cirrhosis and the right lobe was replaced by a cavity, 18 cm in diameter, which contained turbid fluid. The walls consisted of a layer of fibrous tissue, compressed liver tissue and a shaggy inner surface [illustrated in a photograph]. There was no calcification. Microscopically, the vascular collagenous cyst wall showed no liver parenchyma.

The thick-walled cyst had existed for many years, but had distended instead of becoming shrunken and calcified.

The rarity of this combination in the literature is briefly discussed, but the author suggests that it seems unlikely that the cyst and the curculion were present together by chance. This cyst was almost certainly hydatid in origin and had probably existed since childhood. The great age of the cyst and its persistence after the death of the parasite may have had a bearing on the development of curculiosis.

H. J. O'D. Burke-Gaffney

CAYILLARI, C. A. & M. M. de R. Profilaxia de la hidatidiosis en la república Argentina. *Hydatidiosis Profilaxis in Argentina. Bol. Oficina Sanitaria Panamericana* 1949 June 29, No. 6 551-7. English summary.

DE & F. L. L. Echinosoceros ovisina.

—, L'Echinosoceros primitiva. (*Maladies hydattiques*.)

These books are reviewed on pp. 1099-101.

DE LIZENZO, J. F., ROQUE, R. DE A., COLAÇO, A., CRISTINO, E., RÊS, J. F. & COLLASO, M. F. A aniclostomíase rural em Portugal. I. Rural Ankylostomiasis in Portugal. *An. Inst. Med. Trop. Liabon.* 1948 Dec. v. 5 31-69. 12 figs. 14 refs.]

The English summary appended to the paper is as follows —

1. Ankylostomiasis is still existing in Portugal as a rural ankylostomiasis entity infesting a large area in the suburbs of Coimbra (center of Portugal).

2. This parasitosis is spread in some localities of the region, among which Vilarinho 66-5 of the population is infested causing sometimes severe anemias.

3. The Ankylostomidae although more frequent among children from 5 to 10 years old were found in one child aged 18 months and in an old man aged 60 years. The boys are more affected than the girls and they show lower rates of hemoglobin.

4. The infestations are mild in the majority of cases and as maximum one case with 278 worms was found.

5. Besides Ankylostomidae the *Acaris lumbricoides* and *T. trichocephalus* also infest also largely the local populations.

6. The characteristics of the region, such as temperate rainfall nature and hydric richness of the soil, irrigation system of the land and its methods of cultivation are favourable nearly all around the year to the evolution of the eggs of Ankylostomidae and to the longevity of the infesting larva.

7. The precarious hygienic habits of the population and its agricultural occupation contribute largely to the maintenance of the endemic focus.

8. The gravity of the manifestations of Ankylostomiasis per se, the character of malignity it transmits to the intercurrent diseases, the economic deficit it certainly conveys to the parasitized populations and the possibility of the spread of this disease from this focus to other regions of the country urges its extermination. We advise as a prophylactic base the treatment of all patients during the winter season.

VOGEL, H. & MÜLLER, W. Beiträge zur Klinik der Lungen-Ascariasis und zur Frage der flüchtigen eosinophilen Lungeninfiltrate. *Communication on Pulmonary Ascariasis and Transient Pulmonary Eosinophilia*. Reprinted from *Beiträge z. Klin. u. T. Tuberkulose* 1942, 101, No. 8 670-53. 15 figs. 74 refs.

The authors prevailed upon six volunteers between the ages of 30 and 49 years, there is no indication of their being prisoners of war. How certain number of ova of *Ascaris lumbricoides* with some other remains, what clinical

symptoms and X-ray appearances (if any departure from the normal) and blood and sputum changes occurred, whether the clinical picture corresponded with an eosinophilia, and how many ova were needed to produce these symptoms. The numbers of ova swallowed varied from 6 to 45. Nine to twelve days after the ingestion, the X-rays revealed slight pulmonary shadows reminiscent of a mild bronchitis and lasting for three to six days. This was accompanied by a feeling of faintness, pain in the joints, headache, a little breathlessness and a dry cough. Those who had taken the larger amounts, 21 and 45 ova, had higher fever and some crepitations in the lungs. Expectoration was slight, greyish-yellow in colour and microscopically showed some red corpuscles, Charcot-leyden crystals and eosinophiles, but no *Ascaris* larvae. The degree of eosinophilia varied, in two of the subjects it was very low, but in one who had taken 45 ova eosinophiles comprised 38 per cent of a total leucocytosis of 10,600 per cmm on the 18th day, 52 per cent of 10,800 on the 20th, and 36 per cent of 8,600 on the 23rd day. Together with the lung symptoms, signs of allergy were noticed: urticaria, pruritus and facial oedema. It is argued that *Ascaris* larvae may be a cause of Loeffler's syndrome. [This contribution was received by the Journal in question in July, 1942, but even then it was known that the larvae of *Ascaris* in their development passed through the lungs and that, apart from a general eosinophilia, the presence of worms or their ova was associated with local eosinophilia. See also this *Bulletin*, 1949 v 46, 871.]

H Harold Scott

GUHA, P K An Interesting Case of Round Worm Infection with Post Mortem Report *Calcutta Med J* 1949, Apr, v 46, No 4, 115

A young Madrassite of about 25 was admitted to a hospital in Bangalore in 1944 with abdominal pain and vomiting of three days' duration. Three times in hospital, he vomited 30 to 40 roundworms. Despite general and supportive treatment, he died a few hours later. At autopsy "handfuls" of roundworms were emerging from the nose and mouth. There was no sign of peritonitis, but there was a rent of 3½ inches in the greater curvature of the stomach, nearly 200 roundworms were projecting from this opening. Two pockets of roundworms were found in the liver, and one each in the pancreas and the spleen.

It is suggested that the marked under-nutrition and low resistance of this patient played a part in the dissemination of the parasite in these three organs.

H J O'D Burke-Gaffney

GURTNER, H Toxische und antigene Eigenschaften von Ascaridenextrakten [Toxic and Antigenic Properties of *Ascaris* Extracts.] *Ztschr f Hyg u Infektionskr* 1948, Aug 17, v 128, Nos 3/4, 423-39 [28 refs]

The varied character of the symptoms due to *Ascaris*—diarrhoea, vomiting, cramps, and urticaria, conjunctivitis and asthma indicating allergy—is in favour of there being not one single toxin but a combination of them. The author obtained specimens of *Ascaris suus* and prepared four extracts therefrom. Complete extract, protein, carbohydrate and lipid. Minute details of the preparation are given in the paper, those interested should turn to the original, the account is too full for reproduction here. They were then tested by subcutaneous injection into guinea-pigs and rabbits. The first three were dissolved in physiological saline, the fourth in sterile neutral olive oil. The former three were injected in quantities of 1, 2 and 2 cc at intervals of three and two days respectively, the lipid extract intragluteally in doses of 0.5, 1.0 and 1.0 cc at the same intervals. The strongest reactions produced were red or pale

papules 6-8 mm. in diameter visible in 24 hours and remaining for nine days or longer. Complement fixation reactions were also carried out with the sera of immunized rabbits.

Cutaneous tests were also made on 1 human subjects seven with a clear history of *filari* infection, three doubtful and two negative. The results of all these tests animal and human are given in a series of protocols, but may be epitomized as follows. The protein and complete extracts were more potent for guinea-pigs than the other two and the protein more than the complete. Injected intravenously both are rapidly fatal. Both contain a histamine-like substance but it is not histamine itself. Intracutaneously injected into rabbits the complete extract and the lipid fraction were more toxic than the carbohydrate fraction and the latter more than the protein fraction. Complement fixation tests showed that all four extracts possessed antigenic properties. In cutaneous tests on the human subject the protein fraction proved to be the most active and after it in order the complete extract the lipid fraction and, least the carbohydrate fraction.

H. Harold Scott

HOZAN, Z. Age-Acquired Resistance and the Influence of Diet and Light on the Parasite *Ascaris columbae* in Pigeons. *Bull. Inst. Marine & Trop. Med. Acad. Gdansk Poland* 1948, 1, 1, 29-44.

HAFEZ, A. H. Localized Filarial Mass of the Breast simulating Carcinoma. *J. Roy. Egyptian Med. Ass.* 1948 May v 32, No. 6 429-31 figs.

A widow aged 50 had noticed a painless mass in the upper outer quadrant on the left breast for 15 days. The skin of the affected breast was tougher and thicker than that of the other breast, the mass was firm, irregular in outline and fixed in the breast substance adherent to the skin, but not to the underlying muscles. The axillary nodes on the same side were enlarged, not tender and not adherent to each other or to the surrounding structures. There were no other physical signs. Scirrhus carcinoma of the breast was diagnosed and operation advised, which was refused but a biopsy under local anaesthesia was allowed. The mass had the naked eye appearance of carcinoma, but microscopy showed a granuloma containing foreign bodies, which on serial section proved to be portions of a filaria. Subsequent enquiry elicited that the patient lived in a district heavily infested with filaria unspecified but had never suffered from lymphangitis or other filarial manifestation. A microfilariae were found in the blood. In Egypt filariae of the breast usually gives rise to diffuse lephangitis and no report has hitherto been made of localized mass simulating carcinoma.

B. L. Harrell

GALLIARD H. & MILLE H. Essais de traitement de la filariose à *Wuchereria bancrofti* var *Pacificus* par le 1-diéthyl carbamyl, 4-méthyl piperazine à Tahiti. Studies in the Treatment of Filariasis due to *W. bancrofti* var *Pacificus* by 1-diethylcarbamyl 4-methyl piperazine in Tahiti. *Bull. Soc. Path. E. M.* 1949 v 42, No. 5 6 304-13.

Six patients in Tahiti were given 20 mgm. per kgm. of Hetrazan by mouth three times a day for 7 days. The number of microfilariae in the blood fell very rapidly so that within six hours 70-80 per cent. had already disappeared. For 98 other patients the dose was only 25 mgm. three daily for 4 days and 50 mgm. three daily for 3 days (owing to shortage of supplies). 87 per cent. were free from microfilariae at the end of treatment and the others showed great reduction in the microfilarial count. Sixty five patients were followed for 4 months. 47 per cent. showed slight relapses (1-10 microfilaria per 20 mm.).

14 per cent showed heavy relapses and 15 per cent remained free from microfilariae. An attempt was made to treat some patients with single daily doses (2.4 mgm per kgm) but the reactions were too severe and the sterilization was less complete. The treatment is well tolerated and even if reactions do occur in carriers of microfilariae they do not necessitate interruption of treatment.

As regards *general reactions*—The most common symptom is fever, which is usually moderate (37.8–38.5°C) and which comes on at end of the first day, lasting only a day or two. Aches in the head, loins and joints, rigors and tinnitus may also occur. Two cases of benign epistaxis were seen. As regards *reactions of special systems*—Nausea was common. Vomiting occurred only in three subjects, who each expelled many *Ascaris*. Pruritus was common, in three patients there was an intense bullous eruption localized in one of the superior members. These skin reactions are probably allergic reactions due to the destruction of worms. The circulatory and urinary systems were not affected. In some cases there was painful enlargement of the epitrochlear gland or a lymphangitic crisis, which might be interpreted as due to the death of adult worms. [These reactions differ in many ways from those of patients with *W. bancrofti* treated in East Africa, the difference may be due to the different variety of filaria involved.] A pronounced eosinophilia occurred after an initial fall. Examinations of the blood suggested that there might be an increase in the proteins of the plasma.

Experience with patients showing clinical symptoms of filariasis is limited. In five early cases of filariasis with lymphangitis, pain subsided quickly but the signs of inflammation receded more slowly. Other cases of lymphangitis in older patients were also treated but the results were too variable to allow of definite conclusions being drawn. One case of lymph scrotum cleared up well under treatment. In haemato-chyluria no permanent effect was produced. It is noted that cases of acute lymphangitis due to filariasis responded very quickly to benadryl or neo-antergan 50 mgm 3–4 times daily for 2–4 days, this supports the view that such lymphangitis is allergic in origin.

It seems potentially possible by combining the destruction of microfilariae with the destruction of mosquitoes to prevent the constant reinfestation which occurs in Oceania.

F. Hawking

HAWKING, F & LAURIE, W. Action of Hetrazan on Filariasis and Onchocerciasis. *Lancet* 1949, July 23, 146–7.

Hetrazan, 1 mgm per kgm body weight twice daily or 0.5 mgm per kgm thrice daily, removed most microfilariae of *Wuchereria bancrofti* from the blood of man, smaller doses did not clear the blood. Larger doses, 12–20 mgm per kgm daily, cleared the blood usually in three days or less, but rarely a few embryos persisted during the whole of the observation period, which was three months. A single dose of 20 mgm per kgm sufficed in most patients to remove most of the embryos. After giving the drug by mouth in the evening when the microfilarial tide was rising, 60–80 per cent of the embryos disappeared from the blood within half an hour, and after the drug was injected intravenously, 60 per cent of the embryos disappeared in four minutes. On the other hand, embryos lived for several days *in vitro* in contact either with solutions of the drug or with serum from a patient who had received the drug an hour previously, furthermore, embryos persisted in the fluid of hydroceles in patients whose blood had been rendered free from microfilariae by treatment with the drug and in hydroceles into which the drug had been injected. It seems, therefore, that the drug is neither directly toxic to the microfilariae nor does the body change it into a filaricidal substance. It is suggested that the observations support the hypothesis that the drug acts by sensitizing the microfilariae for phagocytosis.

by the reticulo-endothelial system to which they are exposed in the blood stream. It is implied that the embryos do not come into contact with large phagocytes in serous cavities and therefore are not destroyed.

Owing to allergic reactions small doses of drug were used against onchocerciasis, a common dosage being 50-100 mgm. per patient [presumably about 0.75-1.5 mgm. per kgm.] twice daily for the first two days and thereafter 150-600 mgm. twice daily with this dosage embryos sometimes disappeared from the skin after 2-3 days but in other cases persisted for more than 10 days despite continued treatment. Active adult worms were found in nodules excised from 5 of 7 patients who had had 5-12 mgm. per kgm. per day for 13-23 days and active embryos were found in the nodules of all the seven patients. The maximum tolerated single dose of Hetrazan for man appeared to be about 20 mgm. per kgm. body weight. In patients with *H. bancrofti* this sometimes caused nausea and vomiting, with or without epigastric pain, and occasionally produced tender spots in the groin or scrotum. In patients with *Onchocerca* even a single dose of 50 mgm. [presumably less than 1 mgm. per kgm.] always produced a violent reaction which was well marked in 18 hours. There was usually swelling, oedema, itching and tenderness of the skin, with sometimes a papular rash and enlargement and tenderness of the lymph glands and always pyrexia up to 101-102°F. The symptoms subsided after a few days and the patients could then tolerate much higher doses, e.g. 1 mgm. per kgm. daily. The severity of the reaction seemed proportionate to the number of embryos initially in the skin. The authors feel that this allergic reaction is sufficient to make Hetrazan unpopular were it to be used for the mass treatment of onchocerciasis. (These allergic reactions seem to be a feature of the treatment of filariasis with Hetrazan and to be especially marked in onchocerciasis. It seems worth while endeavouring to diminish their severity by the use of sedatives and anti-histamine drugs.)

F. Margatroyd

BARCOO E. Essai de traitement de la filariose (*F. loa* et *F. perstans*) par le 3-789 R.P. Therapeutic Trial of 3,789 R.P. on Filariasis due to *Loa loa* and *Loa loa* (*Loa loa* and *Loa loa*). Bull. Soc. Path. E. 1949 v. 4, No. 4/6, 313-17.

The studies were carried out in the region of Ayos in French Cameroun. 3,789 R.P. is Hetrazan, i.e. 1-diethyl carbamyl-4-methyl piperazine. Five patients infected with *Loa loa* and 4 *perstans* were treated with doses up to 5 mgm. per kgm. twice daily. Microfilariae of *L. loa* were removed from the blood; those of *F. perstans* diminished or disappeared but the author does not attach great significance to this. During the discussion on this paper St. I. Nopoulos described a case of onchocerciasis in a European, whom the allergic reactions to Hetrazan had been so violent (in spite of anti-histamine drugs) that the patient had refused to continue the treatment.

F. H. A. G.

KOHLER C. L., BRUNA H. W., WILLIAM R. W. Filariasis Control by DDT Residual House Spraying, Saint Croix, Virgin Islands. I. Operational Aspects. KOHLER, C. L. P. S. H. 4th F. P. W. 4th 1949 July 8, 64. No. 77 857-62. II. Results. BRUNA & WILLIAM. J. J. 1949 5 11.

DDT applied to houses: a residual spray has been used with success for the control of adult anophelines in different parts of the world and very recently in South America for the elimination of *A. aegypti*. One species of mosquito (*A. albopictus*) appears to have been less susceptible to DDT but the mosquito in the Caribbean region is the vector of human filarial disease. The United States Public Health Service introduced the residual insecticide method to

the local authority of the island of St Croix (84 sq miles) one of the American Virgin Islands group situated to the east of Porto Rico in the West Indies. For all practical purposes the mosquito population appears to be limited to *Culex quinquefasciatus* and *Aedes aegypti*, both domestic types breeding in artificial containers of water or in polluted waters closely associated with human dwellings.

A team of local workers was trained to apply insecticide in the usual way by power sprayer, hand sprayer or both at the rate of 200 mgm DDT per square foot to walls, ceilings, porches and privies of housing of the typical sub-standard type, characteristic of a tropical country and in keeping with the low economic level of the inhabitants. At first DDT in kerosene was used, but this was soon replaced by DDT-Xylene-Triton emulsion [35 per cent DDT-Xylene concentrate, with Triton X-100, diluted with water to form a 5 per cent spray]. Spraying began in October 1946 and finished in May 1948, each dwelling on the island having been treated on four occasions. Continuation of the process was then handed over to the local health department as a "going concern" with the proviso that wettable powders might well be substituted for the emulsions because of the absorbent nature of the wall surfaces. A table provides the detail of work, man-hours and cost, all of which improved as the workers gained experience. In all, 11,078 houses (1,900 sq ft per house) were sprayed, each on four occasions, in 400 working days or 21,630 man-hours at a cost at the last spraying of approximately 1½ dollars per house.

The School of Public Health of Columbia University took the opportunity of ascertaining the effectiveness of this campaign in reducing the transmission of *Wuchereria bancrofti*. Mosquito and blood surveys were conducted before and after the 20-month period of spraying.

The mosquito survey revealed only *C. quinquefasciatus* and *Aedes aegypti* in human dwellings, samples of these were collected from the whole island and conveyed to a central laboratory for dissection. The filaria infection rates are tabulated. In 1946, 2,244 *C. quinquefasciatus* had an infection rate of 7.9 per cent, and 0.40 per cent contained infective forms of the parasite. In 1948, only 846 *C. quinquefasciatus* were collected, of which 3.65 per cent were found to contain developing forms of the filaria but no infective forms were observed. Of 867 *Aedes aegypti* caught in 1946, 2.3 per cent contained developing forms but no infective ones, while in 1948 no *Aedes aegypti* were seen in houses. The end result revealed a 57 per cent reduction in the number of houses harbouring *C. quinquefasciatus* with a 50 per cent reduction in the percentage of infected mosquitoes. In all probability survivors did not live long enough to become infective, *Aedes aegypti* seemed to have disappeared.

Blood surveys for microfilariae were conducted before the DDT programme and 21 months later. Thick blood films were made from pre-school and school children, of 1,311 examined in 1946, those aged 6 years were the youngest to show infection (6.2 per cent), the rate gradually increased with age the maximum being 25.5 per cent in those aged 13 years. The counts varied from one to 741 microfilariae per 0.04 ml of blood in the 13.3 per cent found infected. The 1948 survey of 906 children gave an infection rate of 10.6 per cent, the difference being "not quite statistically significant". However, the percentages positive in those aged 6, 7 and 8 years were considerably reduced, 6.2 to 2.9, 8.9 to 3.5 and 11.9 to 6.7 respectively. Despite variation of microfilaria counts in the same person from day to day, the authors believe that counts in groups of individuals do give an approximation of the degree of infection, the average microfilaria count for all examined fell from 74.1 in 1946 to 45.8 in 1948, the difference again "not quite statistically significant". Of 504 children examined on both occasions, 454 were negative; of the positives, 20 showed increases and 30 decreases in microfilaria counts.

As the authors point out "the microfilaria count of a long lived infection such as *M. bancrofti* will be affected very slowly by the prevention of additional infection and it seems unfortunate that the promising results obtained can be checked no further as another research group are attempting control of filariasis by treatment of all persons on the island. R. Ford Tebb

BARNETT L. C. Prévalence de *M. sonelli* chez la femme de la Guadeloupe [*Mansonella ozzardi* in a Woman in Guadeloupe.] *C. R. Soc. Biol.* 1949 Apr., v. 143 Nos. 2-4: 488-9

MARTZ J. Filariose et tuberculose pulmonaire (Filariasis [*M. sonelli ozzardi*] and Pulmonary Tuberculosis.) *Bull. Soc. Path. Exot.* 1949 v. 42, Nos. 1/2: 25-8.

The author describes a patient a native of Guadeloupe who had returned there after having spent four years in Paris as a medical student. On his return to Guadeloupe he had a severe haemoptysis and it was on this account that he sought advice. In a specimen of his sputum examined by direct smears there was a perfect microfilaria of *M. sonelli ozzardi* presumably present in the blood in this specimen and tubercle bacilli were also found. The filarial infection, which had not previously been diagnosed, was probably acquired before he first went to France because the period since his return (3 weeks) was hardly enough for development. If that was so residence for 4 years in a temperate climate evidently had little effect on the filarial infection.

In the discussion of this paper DECARIEZ referred to the general subject of parasitic diseases which produce eosinophilia in relation to tuberculosis noting that in certain investigations the incidence of tuberculosis was lower in groups of parasitized people than in those not parasitized. The eosinophilia may be a sign of a state of allergy which may itself tend to inhibit tuberculous infection. Charles H. Cockcroft

TOX & MASON, A. Control de oncosomias. Oncoasertolais Control. *Bol. Oficina Sanitaria P. neerlandesa* 1949 June 28, v. 8: 384-48. 1 graph summary

FLOCH, H. & DE LAJOLLE, P. Sur une host microfilarie circule en (zone Française Twenty-Eight Forms of Microfilaria in Animals in French Guinea.) *Institut Pasteur de la Guinée et d. Togo* d. 11 Publication v. 12, 1942, Sept. 30 pp. 5 pt. 1 ref.]

FERREIRA, F. C. & LOPES, E. M. R. Aspectos clinicos e epidemiologicos dum foco endêmico de dracunculose na Guiné Portuguesa. Clinical and Epidemiological Aspects of a Focus of Dracunculiasis in Portuguese Guinea. 1 *Inst. Med. Trop. Lisbon*, 1949 Dec. 5: 71-88. 23 figs. on 13 pls. 1 map. English summary

A very clear account of dracunculiasis as it affects five villages in the N'zara district at the north-west of Portuguese Guinea. The inhabitants of these villages total 1011. Of these 78 were examined and 186 (23.5 per cent.) were harbouring the worms and 28 of these had more than one. To compare the percentage infection in the different villages might convey wrong impression because the population and the numbers in each village who were examined varied so widely. Thus in Camabol with 583 inhabitants 406 were examined and 100 found infested 8 of them with multiple infestation thus gives a percentage of 20.6. At Caruati the other extreme there were 59 inhabitants

25 were examined, 9 were positive, 7 with one and 2 with more than one worm. This is given as 36.0 per cent infestation. Looked at thus, Tanhate with 88 inhabitants showed the highest rate, for of 68 examined 33 were positive (48.8 per cent), 8 of them with multiple infestation. Of the total 792, 197 were children [age not stated] and 36 (18.3 per cent) of them were positive, 595 were adults and 150 (25.2) were positive. Many more adult males were infested than females, 98 out of 288 males (34.0 per cent), 52 out of 307 females (16.9).

During the incubation period, *i.e.*, the time between ingestion of the embryo and appearance of the worm, 10–14 months, there may be no symptoms, but a few hours before the worm makes its appearance there may be local erythema and oedema, with pruritus and even generalized urticaria, dyspnoea and asthmatic attacks, nausea, vomiting, vertigo or syncopal attacks and nervous symptoms such as delirium or mental confusion, but these are not common. The site where the worm appears was noted in 201 instances. In the upper limb 8 (shoulder 1, upper arm 3, forearm 1, hand 3) or 3.9 per cent, in the lower limb 182 (90.5) groin 1, thigh 15, knee 13, leg 90, foot 63, and in the trunk 11 (5.5) (in the lumbar region and flank 2 each, the abdominal wall 7). These are well illustrated in a series of photographs. Synovitis and arthritis are fairly common complications and cysts of embryos may appear (these are also depicted). The crustacean host is *Mesocyclops leuckarti* subspecies *aequatorialis*, but *Daphnia* is also very common. The usual prophylactic measures are mentioned. Prohibition of those infested bathing in waters which may be used for drinking, and purification of drinking water contaminated by possibly infected crustacea.

H Harold Scott

DAENGSVANG, S. Human Gnathostomiasis in Siam with reference to the Method of Prevention. *J Parasitology* 1949, Apr, v 35, No 2, 116–21, 4 figs [15 refs.]

Gnathostomiasis has been reported in many countries in the Far East, but the largest number of cases have been from Siam. The author adds 17 more Siamese cases, the subjects, who were patients in the Siriraj Hospital Bangkok, were all women except two and were aged 18 to 80 years. The parasite, *Gnathostoma spinigerum*, was identified in each case.

The author has divided his cases into 5 clinical groups according to the tissue or organs into which the worms finally migrated. In nearly every case there was a primary phase of migration in the skin or subcutaneous tissues. The lesions were usually itchy, tender and painful, the pain was of a pricking or boring nature. There was no local oedema or pitting. Fever was usually absent. Eosinophilia was almost constant, it varied from 5 to 73 per cent.

Attacks usually lasted up to 10 days but were sometimes prolonged for a month or more, and they recurred up to six times a year. The duration of the infection varied, in one case it was three years. The infection terminated spontaneously by the rupture of mature or immature worm through the skin or mucous membrane. In other cases the worms were removed surgically.

Group 1 consisted of 6 patients in whom the swellings were mainly on the chest and abdomen, the worm did not migrate beyond the skin or subcutaneous tissues.

Group 2 consisted of 3 patients on whom the migration reached the neck and face, and involved the eyelids and eventually the eye itself. In each case a worm was removed from the eye, in two from the iris and in one from the anterior chamber.

Group 3 consisted of 3 patients who had lung symptoms after a period of cutaneous migrations. In each case a worm was eventually coughed up,

after which the symptoms subsided. In one case there was a period of meningeal irritation with semi-consciousness lasting 7 days.

Group 4 consisted of 4 patients who after suffering periods of cutaneous migration of the worms developed movable abdominal tumours. The tumours grew slowly and were tender but there were no other symptoms. At laparotomy a smooth rounded hard tumour of the omentum adherent to the ileo-caecal part of the intestine was removed in each case. The tumours were all about 6 cm. in diameter and in each a gnathostome was found in the centre of a necrotic space.

The last group consisted of one patient in whom the worm eventually presented in the soft palate.

The author refers to additional cases in which there were symptoms of haematuria and leucorrhoea when the worms migrated into the bladder and uterus respectively.

Antimonials have proved of uncertain use in this infection. Surgical removal of the worm is the only treatment.

The life cycle of this worm is reviewed (see this Bulletin 1933 v 30 711). The worms are normally found in the stomach wall of cats and dogs. The eggs pass into the bowel lumen and are excreted. A free-living larva emerges. The first-stage larva is ingested by a cyclops in which the second stage larva develops. When the cyclops is ingested by a fish the worm develops further and is surrounded by a cyst wall. Transmission to the natural definitive hosts and to man occur through the eating of the infected fish. The infective larva takes 8 months to develop into an adult the whole cycle takes 8 months.

A common medium of infection is a fermented food made mainly of fresh water fish available in the local market in Siam. Women are particularly fond of this food. The larvae are killed by boiling for 5 minutes or by leaving in vinegar (4 per cent. acetic acid) for 5½ hours. They however survive 4°C. for a month.

L. E. Naper

CHEN H T. A Human Ocular Infection by *Gnathostoma* in China. *J Parasitology* 1949 Aug v 35 No 4 431-3 23 refs.

Worms of the genus *Gnathostoma* sometimes cause skin or subcutaneous infections in man this Bulletin 1949 v 46 857. The author summarizes 29 proved cases up to 1947 together with the literature concerning this infection in man and animals in the Far East.

With three exceptions, all species identified have been *G. sp. japonicum*. One recorded from Japan was *G. hispidum* (this Bulletin 1974 v 51 960) and two from India did not appear to belong to either species. *Id.* 1930 v 7 481 1945 v 41 919.

The present case refers to a native of Canton aged 45 who had a gnathostome worm lying on the iris in the anterior chamber of the left eye the worm was successfully attracted. This is the third recorded ocular gnathostomiasis the others having been reported by MIKAZI and HASEKI *ibid.* v 31 610 both in Bengal in 1945 *ibid.* 919 1949 v 43 57.

The worm in this case was in an immature form 5.4 mm. long and 0.40 mm. wide. A detailed description of its morphology and measurement is given. Because of the nature of the Japanese booklet and the text of the book it has been tentatively identified as *G. hispidum*. The disputed question of the manner of human infection is discussed and the author thinks it likely that the patient may have been infected by eating raw fish delicacies which are popular among certain classes in Canton.

It is suggested that human gnathostomiasis may sometimes be wrongly diagnosed or easily overlooked, because of its rarity.

H. J. O'D. Burke (Ipswich)

Vol 46, No 11]

WALKINGSHAW, R A Subcutaneous Migrating Embryo as that recorded by
1949, June, v 3, No 4, 264

This would appear to be the same case of gnathostomiasis as that recorded by
SANDOSHAM [this *Bulletin*, 1949, v 46, 857] but the finger affected, the colour,
dimensions and name given to the worm differ in the two papers
H J O'D Burke-Gaffney

MARTELLI, T & ZAFFINO, C Sulla frequenza dell'infestazione da *Oxyuris*
vermicularis nell'età infantile [Incidence of *Enterobius vermicularis*
Infestation in Infants] *Ann d San Pubblica* Rome 1949, Mar-Apr,
v 10, No 2, 370-75, 4 figs English summary (3 lines)

The authors, after quoting figures from the literature of several countries on
the prevalence of *Enterobius* infestation among children, record their own
findings among 220 children examined by them in a district of Rome They
used the "Cellophane swab method" The children both boys and girls, were of
all social grades and their ages ranged between 2 and 12 years Seventy-four
were positive Though commonest among those of school age, infestation
was also found in the very young, 2-5-year-olds They note that the ova
have been found not only in the infants themselves, but on their clothes,
sheets bedding and even on the window-sills of the rooms, so that infestation
may be dust-borne [as is well known], also that there are probably adults
harbouring the worm and acting as chronic carriers Besides the pruritus,
insomnia and fretfulness, the infestation may cause various other disturbances—
pallor, loss of weight, poor appetite, masturbation, leucorrhoea—and, in adults,
nyctophomania
H Harold Scott

BROOKE M M, DONALDSON, A W & MITCHELL, R B A Method of supplying
Cellulose Tape to Physicians for Diagnosis of Enterobiasis *Pub Health Rep*
Wash 1949, July 15, v 64, No 28, 897-901, 2 figs

The authors describe a modification of the Graham cellulose-tape technique
[this *Bulletin*, 1941, v 38, 525] which can readily be made available to
physicians and can be used by members of a patient's family
To one end of a strip of clear, transparent cellulose tape ($\frac{3}{4} \times 4$ in) is stuck
a piece of paper $\frac{3}{4} \times \frac{1}{2}$ in The tape is pressed to a clean slide (1×3 in) and
looped over the end so that a small portion adheres to the under surface of the
slide The paper serves as a tab for lifting the tape The preparation may be
mailed in a slide container

For use, the longer strip of cellulose tape is lifted from the slide by means
of the paper tab the section thus freed is looped over to expose the gummed
side, which is then made to touch the perianal region several times The tape
is then replaced on the surface of the slide, where it can be examined directly
with a 16-mm objective for the presence of *Enterobius* eggs

Experiments on the keeping power of cellulose-tape preparations are described
Those placed in slide containers and stored at room temperature while those kept
in a refrigerator or exposed to direct sunlight deteriorated Large numbers of
these slide preparations may therefore be prepared in inexpensive kits suitable
for distribution to physicians by public health laboratories and parents can
be instructed in taking the specimen in the home at a time most favourable for
recovering the eggs, e.g., at bedtime or in the morning before there has been a
bowel movement or a bath Detailed descriptions are given in the paper and
are well illustrated with clear line drawings
H J O'D Burke-Gaffney

WIGAND R. Therapeutische Diarrhoeen zur Beseitigung der Enterobiasis vermicularis. [Therapeutic Diarrhoea for *Enterobius vermicularis* Infestation.] *Med Klin* 1949 Jan. 14 v. 44 No. 2, 51 —

According to Schöffner the length of life of *Enterobius vermicularis* ranges from 37 to 83 days. As soon as the ovary becomes packed with eggs the worm looses her hold on the intestinal wall and lies passive in the faecal stream. The author awests the passage to the exterior by giving saline purgatives, Glauber's harshad or Epsom salts, which are taken in warm water when the patient is fasting. The result must be definitely watery stools and not merely loose diarrhoeic stools, so that the fluid may act like a cataract. This treatment may be given twice in a week, but the purging should not last more than the one day and in 5 weeks the patient is usually free from worms.

H. Harold Scott

ERRATUM

In the abstract of the paper by HALAWANI *et al.* [this Bulletin 1949 v. 40 753] the symbol *mgm.* should read *µgm.* in the following positions

Para. 1 lines 14 and 17

Para. 2, lines 9 and 10

DEFICIENCY DISEASES

VALLOTTOY M. Zur pathologischen Anatomie der B₂ Avitaminose (Myokard und Duraveränderungen im Rattenexperiment) (Pathological Anatomy of Avitaminosis B₂) [Internat. Ztschr. f. Lishenig. Berne 1949 v. 21 No. 1 61-83 5 figs. (47 refs.)]

The English summary appended to the paper is as follows —

~ Similar changes are produced in the dura mater of the rats after deficiency of long duration of vitamin B₂ as described in men before and in the beginning stages of the chronic haemorrhagic internal pachymeningitis. They are dilatation, hyperaemia and increase of the capillaries with formation of sprouts and close loops in surrounding places, light deposits of haemoderin loosening of the connective tissue. Trauma causes only bleeding which is of importance to the progression of the illness. Further widening and hyperaemia show the capillaries of the myocardium. The sarcolysis as described by Wernick such as classic phenomenon of deficiency of aneurin is found in the muscles of the heart walls. When the illness is of long duration, the focal muscular lesions are apt to get confluent and to be transformed in connective tissue. The decomposition of the fibrils can be only attributed to the lack of vitamin B₂ because the food of animals contains all the other necessary component especially proteins in sufficient quantity.

BEAN W. B., VILTER R. W. & BLANKENHORN M. A. Incidence of Pellagra. Studies in the Cincinnati General Hospital 1935-1947. *J. Amer. Med. Ass.* 1949 July 9 140 No. 10 307-3 1 chart

~ 1. There has been a striking decrease in the number of cases of pellagra seen in the Cincinnati General Hospital in recent years.

~ Since 1940 pellagra has occurred with increasing rarity and in the last 30 months only 1 case has been seen.

3. This change occurred during a period when active studies of the disease were in progress and interest was sustained.

"4 The cause for this decrease in unknown The most likely reason is the general improvement in the economic state of the population from which the hospital draws its patients

"5 The program of enrichment of flour and various educational activities may have served to sustain the trend but did not initiate it "

COSTA, D Pelagra associada a múltiplas desvitaminoses [Pellagra with Multiple Vitamin Deficiencies.] *Hospital* Rio de Janeiro 1945, Feb, v 27, No 2 323-39, 5 figs English summary [18 refs]

The case is described of a boy of 7 years with signs of pellagra, butterfly patch, desquamation, fissures at the angle of the mouth, with decay of teeth, discoloured gums, dry conjunctiva and loss of lustre, mentally dull, resentful, irritable, his weight was only 22 kgm and the general state of nutrition bad. The family was very poor, the child never had meat or milk, only once a week did he have fruit or vegetables, for breakfast and dinner coffee and bread, twice a week he had cornmeal

Regulation of the diet and administration of nicotinic acid and, later, liver extract brought about cure The author wishes to stress the fact that pellagra can exist without all the typical signs being present, and also that some symptoms not distinctly pellagrous according to the textbooks, may be basically so and thus clear up on anti-pellagra treatment *H Harold Scott*

SPRUE

FOX, H J Observations on the Proteolytic Activity *in vitro* at Neutral Reaction of Gastric Juice from Patients with Sprue *J Clin Investigation* 1949, July, v 28, No 4, 687-9

"1 When equal quantities of normal human gastric juice and 1 per cent casein solution are incubated at 37.5°C and pH 7.4, there is a progressive increase in filtrable nitrogenous substances The proteolysis was not considered to result from pepsin because the activity was maximal at pH 7.4 Also, since there was no significant increase in amino nitrogen within 24 hours, together with the persistent increase in total filtrable nitrogen after exposure to pH 10, it is considered that the proteolysis was not due to trypsin

"2 The proteolytic activity of the gastric enzyme at neutral reaction, is present to a normal degree in cases of sprue in remission It is greatly diminished in cases of sprue in relapse The absence of proteolytic activity in cases of pernicious anemia suggests that the deficiency of intrinsic factor so characteristic of pernicious anemia, may be present in sprue in relapse

"3 In two non-anemic normal subjects, it appears that infection inhibited this type of proteolysis to a considerable degree "

HAEMATOLOGY

SPIES, T D, GARCIA LOPEZ, G, MILANES, F, STONE, R. E, LOPEZ TOCA, R, ARAMBURU, T & KARTUS, S Observations on the Effect of an Animal Protein Factor Concentrate on Persons with the Macrocytic Anemia of Pernicious Anemia, of Nutritional Macrocytic Anemia and of Sprue, and on Persons with Nutritional Glossitis *Blood* 1949, July, v 4, No 7, 819-26, 4 figs [18 refs]

"The intramuscular injection of animal protein factor concentrate to 5 cases of pernicious anemia in relapse, 4 cases of nutritional macrocytic anemia in

relapse and 3 cases of tropical sprue in relapse was followed by a positive hematologic response in each case as is illustrated in figures 1, 2, and 4 respectively. The parenteral administration of this material to 3 patients with nutritional glossitis unassociated with anaemia was followed by the disappearance of the redness and soreness of the tongue."

SEITALA, A. Studies on the Haemoglobin Values of the Blood and on Anaemia in the Population of the Kärkölä District. *Ann 3rd Intern Fenniae* Helsinki, 1949 v 28, Suppl. 4 52 pp. 4 figs. 82 refs.]

Haemoglobin determinations were made on 4 075 persons of Kärkölä district of Finland—this number constituted 70 per cent. of the population.

Four cases of frank *Diphyllobothrium latum* anaemia were excluded, but the series included 177 worm carriers. Analyzed separately these showed the following figures—

	Number	Established mg. haemoglobin per 100 ml.	Deviation from normal value
Men ..	39	15.1	+0.01
Boys ..	19	12.30	+0.14
Women ..	61	11.91	-0.1
Girls ..	11	11.00	-0.09
Total ..	127	12.35	-0.05

The author notes that the effect of the presence of the worm appears to be greater on women than on men.

L. E. Napier

TRINÇÃO, C. Anemia de células falciformes. (Sickle-Cell Anaemia.) *An. I M. Med. Trop. Lisbon*, 1949, Dec., v 5 357-400 1 pl. [Bibliography.]

A useful compilation of the literature and present knowledge of sickle-cell anaemia giving the names of the authors, the locality, the ages of the patients and the numbers of observations, together with brief considerations and notes of the clinical symptoms, the physical signs and details of the blood changes. The whole is well documented—more than 150 references are given and full credit to British observers.

H. Harold Scott

NEEL, J. V. The Inheritance of Sickle Cell Anemia. *Science*, 1949, July 15 61-6 [16 refs.]

CHEV S. C., FLEMING Eleanor M. & CASTLE W. B. Studies on the Destruction of Red Blood Cells. V. Irreversibly Sickled Erythrocytes: Their Experimental Production in Vitro. *Blood*, 1949 May v 4 No. 5 794-803

In sickle-cell disease when the erythrocytes are deprived of oxygen they tend to assume a sickle or oval shape but when they are again exposed to oxygen the majority reassume their normal discoid shape. A certain number however do not recover their normal shape. These irreversibly sick cells differ from the others in showing no filamentous processes. The factors that cause this irreversibility were studied in a series of experiments with the blood of four patients with sickle-cell disease.

After the erythrocytes of these 4 patients had been kept for 24 hours at 37°C. in the absence of oxygen, they were then exposed to oxygen. The cells which had been kept in the absence of oxygen for 24 hours and then exposed to oxygen largely retained this ability to revert to the discoid form when exposed to oxygen. The cells which had been kept in the absence of oxygen for 48 hours and then exposed to oxygen largely retained this ability.

The studies confirmed the hypothesis that frequent stagnation of the red cells in the tissues with subsequent sickling eventually leads to the production of irreversible sickled forms

The fact that sickled reticulocytes are seldom seen in blood films is accounted for by the observation that these young cells do not readily acquire the irreversible sickling property

L E Napier

PRATT-THOMAS, H R & SWITZER, P K *Sicklemlia its Pathological and Clinical Significance* *Southern Med J* 1949, May, v 42, No 5, 376-83, 9 figs [14 refs]

In a series of 2,008 necropsies on negroes in South Carolina, some form of sickle-cell disease was demonstrated in 115 (5.72 per cent), in 23 (1.14 per cent) of these there was sickle-cell anaemia

"While sicklemlia need not be clinically significant and does not necessarily predicate a shortened life, it is believed that at times it is responsible for lesions and untoward results occurring in those states which produce a lowering of oxygen tension"

Any conditions causing shock, traumatic or otherwise, and prolonged general anaesthesia are liable to produce a general anoxaemia which results in an increase of sickling of erythrocytes accompanied by an increase in their viscosity. This causes localized agglutinations of erythrocytes which produce obstruction and infection without necessarily thrombosis, the authors believe that thrombus formation is actually the exception rather than the rule. Thus localized agglutination causes local anoxia, damage to the vessel walls, transudation of fluid and haemo-concentration. A vicious circle is thus established which could only be reversed by oxygenation of the erythrocytes so that they recover their discoid shape

The authors give a number of examples of patients who showed no evidence of sickle-cell anaemia but in whom death, usually after operations, was due to widespread vascular obstruction and others in which this was probably an important contributory cause of death

In the discussion on this paper, Dr Paul Kummelstiel questions whether the "conglutination" of the red cells could be the primary cause since he cannot conceive that such a condition could be reversible. He believes that vascular spasm is the first event and that the conglutinations are secondary. In such circumstances relaxation of the vascular spasm could cause a reversal of the condition

L E Napier

FADEN, R S *Ovalocytosis associated with the Sickle Cell Trait* *Blood* 1949, May, v 4, No 5, 505-10, 3 figs [13 refs]

A case is reported in which a negro's blood showed both the sickle cell trait and ovalocytosis. In the peripheral blood the percentage of sickled cells varied from 3 to 11 and the percentage of ovalocytes from 65 to 84

In the only previously reported case of this nature, some of the oval cells showed the sickling property, but in the present case in a sealed wet preparation only the normal, discoid cells sickled in 18 hours, the ovalocytes underwent no change in 72 hours, and there was no increase in the numbers within this period. The blood picture was otherwise within the normal limits, except that there was an increased resistance to hypotonic saline solutions

L E Napier

G

KAPLAN E. & LEWIN S. R. The Effect of Human Plasma Transfusions on the Fetal Urobilinogen Excretion in Sickle Cell Anemia. *Blood* 1949 Aug. v 4 No. 8 847-57 5 figs. [10 refs.]

"1 The results of transfusion of whole plasma and blood on the fetal urobilinogen excretion of 5 children with sickle cell anemia have been reported.

"2 The phenomenon observed by Joseph—a reduction in urobilinogen output following plasma transfusions—has been confirmed.

"3 It has been observed further that in certain patients the continued use of plasma transfusions induces a reversal of this phenomenon, namely an increase in urobilinogen output after each transfusion.

"4 The possible significance of these phenomena is discussed and attention is called to the limitations inherent in accepting urobilinogen excretion as a valid index of hemoglobin destruction in certain disorders in which a defect of hemoglobin metabolism may be present."

VENOMS AND ANTIVENENES

STANIĆ M. Acquired and Experimental Hypersensitiveness to Man and Animal from the Venom of the *Vipera ammodytes*. *Acta Med 1 generica* 1949 v 3 No. 1 1-8, 6 charts

PHILPOT V. B. Jr. Influence of Snake Venom on Mammalian Erythrocytes in Vitro. *Amer J Physiol* 1949 July 1 134, No. 1 7-32. [10 refs.]

"Water moccasin and copperhead venoms bring about agglutination and subsequent hemolysis of washed human erythrocytes. The venom of the rattlesnake *C. adamanteus* also hemolyzes washed human erythrocytes, but not to the same degree as occurs with water moccasin and copperhead venoms. Human serum inhibits the hemolytic activity of the 3 venoms on human cells. Serum of the dog and sheep activates the action of water moccasin venom on their homologous erythrocytes whereas serum of the rabbit and man act as an inhibitor. Dog cells in the presence of serum are much more susceptible to the action of rattlesnake venom than are human cells. Fresh dog serum heated dog serum and rabbit serum will activate rattlesnake venom hemolysis of dog cells.

DOUGLAS R. S. Black Widow Spider Bites: their Physiological Effects, Treatment and Prevention. *N J B J* New Jersey 1949 May 9 No. 1 4 12, 1 hex

MACKENROY J. E. Breve revista sobre 1 rashmo cutaneo-gangrenoso y hemolitico en el Uruguay. A Note on Gangrene of the Skin and Hemolysis caused by the Bite of Spiders in Uruguay. *Arch Uruguays de Med. Ciruj. y Especialidade* 1948 Nov-Dec 33 Nov 56 173 7

The English summary appended to the paper is as follows:—

Brief review about gangrene of the skin hemolysis and local necrosis produced by the bite of spiders.

One spider was captured and classified—the genus *Loxosceles*.

"General symptoms may be severe and death is not rare but usually the general symptoms last a few days evolution during 5 days.

"An improvement is observed usually during the 5th day but it is more remarkable during the 6th day. Nevertheless local symptoms last for several weeks.

DERMATOLOGY AND FUNGUS DISEASES

GREENWOOD, K Common Skin Disorders of the Army in the Tropics J Roy Army Med Corps 1949, June, v 92 No 6, 284-9

This article consists of a survey of the commoner dermatological problems encountered at the Military Hospital, Singapore Fungus infections were exceedingly common and accounted for 20 per cent of all out-patients and 28 per cent of inpatients The most common fungus found was *Trichophyton mentagrophytes* which the author considered to be a variant of *Trichophyton interdigitale* The author did not believe this to be indigenous to Malaya but considered that it was imported on the feet of the European soldier Other species of fungus found were *Trichophyton interdigitale*, *Epidermophyton floccosum*, and *Trichophyton rubrum*

On the face a typical ringed lesion might be found, more commonly however tinea barbae presented with deep seated pustular lesions over the beard area, and the subsequent development of abscesses which sometimes reached considerable size This is the condition known as Kerion

On the feet an interdigital fungus might present as an area of redness, scaling and maceration or, as typical rings of vesicles or broken vesicles The author emphasizes that the vesicle was a non-specific reaction to various aetiological agents It might result from fungus infection in which case it could be cleared with fungicides or it might develop as a reaction to over-treatment If more fungicides were applied to the latter condition it would be aggravated Pompholyx was frequently encountered, appearing sometimes as a secondary reaction to an interdigital fungus infection, and sometimes as a non-specific eczematous eruption

Prophylactic treatment of fungus infection was of the greatest importance, every officer should be capable of looking at the skin for obvious lesions, and examining toe-clefts for early signs A useful prophylactic paint was

Brilliant green	1 0
Hydrarg perchlor	0 1
70 per cent spirit ad	100 0

For curative treatment, various fungicides were effective such as 2 per cent chrysarobin in Lassar's paste, Whitfield's ointment and lotion, and Castellani's paint The undecylenates and propionates did not appear strong enough to control infection

Other conditions encountered were contact dermatitis and dermatitis medicamentosa These were no less common in Malaya than elsewhere Sensitivity to oil resulting in a vesicular eruption of the fingers, and dermatitis on the waist, thighs and buttocks as a result of sensitivity to green uniform were two conditions of frequent occurrence

While mild cases of acne improved especially after exposure to sunlight, severe pustular acne did badly and men with this condition should not be sent out Prickly heat responded to light airy clothing, sun bathing and sufficient baths to maintain cleanliness but no more Soaps used should be of the blandest possible kind In treatment, a 10 per cent salicylic acid lotion could be used cautiously The author concludes his article with the following useful hints —Bullous impetigo was very common and could be treated with any mild antiseptic

Scabies must be treated first, then the secondary infection, chronic urticaria sometimes resulted from helminth infection The diphtheria bacillus was an occasional cause of tropical ulcer The depigmented patches on Malays were due to pityriasis versicolor and responded to any fungicide

H T H Wilson

SIMONS, R. D. G. Is *Tinea albigena* Nieuwenhuis a Separate Disease or an Indonesian Pinta combined with Epidermophytosis? *Documenta Neerlandica et Indonitica et Malaria Tropica*: Amsterdam, 1949 June v. 1 No. 2, 182-93 14 figs. 17 refs.]

Nieuwenhuis in 1903 described a form of mycosis involving mainly and almost exclusively the hands and feet. He found in association with the lesions a fungus which he grew and considered a *Trichophyton*. Though in respect of depigmentation it resembled *mal del pinto* in certain points it was, he said, to be differentiated by the fact that *mal del pinto* never invades the palms or soles. Nieuwenhuis named the fungus *Trichophyton albigena* s. Later in 1925 OTA transferred it to the genus *Ctenospora* and 10 years later still Dorcex called it *Aletrisima albigena* s.

Nieuwenhuis described the disease as having two stages: papules and vesicles in the first stage and, years afterwards, depigmentation. At this time fungi were being recorded as being associated with and the cause of pinta. But—and this is very important—pinta has since been proved to be due to a spirochaete and the fungi were chance concomitants, and also pinta may affect the hands and feet. The author gives brief notes of two cases, one of *melung* (pinta) and one of "*Tinea albigena*" (Nieuwenhuis's *Trichophyton albigena* s).

Very clear photographs illustrate this article and the discussion is full of interest and cannot be summed up better than in the author's own words in which he says he is led to conclude that—

"(1) NIEUWENHUIS was mistaken in separating *tinea albigena* from pinta on the strength of the assertion that pinta does not invade the palms of the hands or the soles of the feet.

"(2) He demonstrated fungi that (a) are not specific, (b) are also found in epidermophytosis.

"(3) He described pleomorphism as a characteristic feature in a number of cases.

"(4) His picture of *tinea albigena* represented pinta or pintoïd framboesia in some instances this disease may be clearly recognized.

"(5) His experiments with inoculation did not constitute proof. It was also unable to induce discolouration.

"(6) He found fungi that were isolated from vesicles on the soles of the feet and around which no achromas had generally occurred.

"(7) *ZIEGLER*'s *melung* was never conclusively separated from pinta, its symptoms were identical with those of pinta, according to *ZIEGLER*'s description.

"(8) The same holds good for *JEANSEUNE*'s *khj huen*, which was also considered to be *tinea albigena*.

"(9) Nowhere in the literature can NIEUWENHUIS' findings be confirmed, but his false differential diagnosis has always been copied.

"(10) In my opinion the different names of the fungi being in vogue by present have terminological significance only. H. Harold Scott

LEITE, A. S., DA LUZ, J. V. B. & DE MEIRA, M. T. V. ("mosy foot" in Africa. *Am. Inst. Med. Trop.* Lisbon, 1948, Dec v. 5 7-30 11 figs. on 4 pls. 39 refs. English summary

In an expedition to Angola in 1945 the authors saw several cases of what is generally known as mosy foot first described by Wolterstan Thomas in 1910. They refer to the various accounts in the literature describing verrucous conditions of the feet and legs to *Acrotheca*, *Phallophora*, *Hormodendron*

Fonsecaea and other fungi, and describe the lesions in the various stages in detail. These need not be stated here, the appearance is well known to readers of the *Bulletin*. The most interesting part of this contribution is that dealing with the diagnosis, for it shows that "mossy foot" is a generic rather than a specific term and covers—at all events has covered—a number of really different conditions. Among these are dermatitis verrucosa and forms of chromoblastomycosis, Madura foot, leishmaniasis, leprosy and elephantiasis and others less likely to be confused, such as syphilis, verruca peruviana and yaws.

The authors put forward the view that the cause may be a streptococcus which has gained entrance through some surface wound and that the inflammatory, hypertrophic and other changes are secondary to this, by setting up lymphatic obstruction and repeated "inflammatory crises."

Modes of treatment have been many: radiotherapy, thermocautery, elastic compression, chemotherapy with arsenicals, iodides, bismuth, acriflavin and potassium permanganate, but until more research has been carried out to determine the actual cause and to separate the various conditions included under the term mossy foot, the treatment must be largely empirical. The article is embellished with good photographs of the clinical condition and photomicrographs of the histological changes. *H Harold Scott*

CRAWLEY, E. P. Sporotrichosis, a Protean Disease with Report of a Disseminated Subcutaneous Gummatous Case of the Disease. *Ann Intern Med* 1949, June, v 30, No 6, 1287-94, 6 figs [10 refs]

A case of the rare disseminated subcutaneous form of sporotrichosis is described. The patient, a man aged 70, had suffered from a generalized papular, gummatous and ulcerative eruption on the skin for several weeks. The first lesion noticed was an erythematous papule, situated on the lower part of the back, which softened and ulcerated within a few days. This was followed quickly by the appearance of similar papules on the right thigh and right temporal region, and very soon by a generalized eruption affecting the face and neck, trunk and extremities. The lesions were indolent, discrete and polymorphic, varying from the size of a match-head to a cherry. They commenced as firm erythematous papules which later underwent central softening, broke down and discharged their purulent contents, leaving a central crateriform ulcer with firm indurated margins. Some of the lesions were in process of healing. In addition to the skin lesions, the proximal phalanx of the right great toe and of the left fourth finger as well as the middle phalanx of the right fourth finger were swollen and inflamed, and radiography showed an underlying osteomyelitis. Despite the large number of lesions the patient's general health appeared to be unaffected and the only subjective symptom was pruritus.

Sporotrichum schenckii was isolated in culture from the lesions, although it was not found by microscopical examination of smears and sections. Prolonged and intensive treatment with potassium iodide brought about complete resolution of the lesions including those of the small bones of the hand and foot.

J T Duncan

KIRSCH, E. Die Histoplasmose. Eine Uebersicht. [*Histoplasmosis a Review*] *Ztschr f Tropenmed u Parasit* Stuttgart 1949, Aug, v 1, No 2, 287-300, 3 figs [69 refs]

A general account

EMMONS C. W. Isolation of *Histoplasma capsulatum* from Soil. *Pub Health Rep. Wash.* 1949 July 13 v 64 No. 23, 267-8 17 figs. [15 refs.]

Although histoplasmosis was discovered by DARTING more than 40 years ago its epidemiology is still imperfectly known. The disease occurs in men and dogs and recently EMMONS *et al* [this Bulletin 1948, v 45 207] found it in the rat and mouse on a farmstead in Loudoun County, Virginia, where human and canine cases of histoplasmosis had occurred. Like other systemic mycoses caused by dimorphic fungi, histoplasmosis is not transmitted from host to host but infection is presumed to be caused by spores of the saprophytic form of the fungus vegetating in nature. Up to the publication of the present paper no report of the discovery of the saprophytic form of the fungus vegetating under natural conditions had been made.

EMMONS, applying the methods which he used so successfully in his epidemiological study of coccidioidomycosis (*Pub. Health Rep.* 1942, v 57 1049) examined 387 samples of soil taken from the farmstead referred to above and succeeded in isolating *H. capsulatum* from two. The fungus was isolated by inoculating the soil washings intraperitoneally into mice and making cultures from the liver and spleen of the animals which were killed from 3 to 5 weeks after the date of inoculation. Direct cultivation from the soil was impracticable because of the number of contaminating micro-organisms, but microscopic examination of the washings of the two infected soil samples showed the characteristic tuberculated macroconidia of the saprophytic form of *H. capsulatum*.

A. The two significant samples had been taken from the same mass of red earth apparently removed from rat burrows. It may be contended that they were merely contaminated by infected animals, but the discovery of the characteristic macroconidia showed that the fungus had vegetated saprophytically on the soil and indicated that the parasite can complete its developmental cycle in this environment.

J. T. Duncanson

TAYLOR A. B. & BRIKEY A. K. Observations on Primary Coccidioidomycosis. *Ann Intern. Med.* 1949 June v 30 No. 6 1224-31 5 figs. & 1 chart [18 refs.]

Much of the ground covered by the authors has been dealt with in earlier papers by GOLDSTEIN & LOVIE (*Bulletin of Hygiene* 1944 v 19 774), GOLDSTEIN & McDONALD (*ibid* 770), WILLETT & WEISS (1945) and SMITH *et al* (1946) [this Bulletin 1946, v 43 857, 1947 v 44 675].

Forty-three proved cases of primary coccidioidomycosis which included 39 males (7 were Negroes and 1 a Filipino) and 4 females were studied clinically and followed-up after convalescence. The following symptoms were recorded: Chest pain (90 per cent. of the patients) was usually substernal and not sharply localized. It was aggravated by deep respiration and by coughing, but no matter how severe it may have been it invariably subsided after two days rest in bed. Cough (44 per cent.) was usually nonproductive and tended to disappear after a few days rest. Blood-streaked sputum was rarely seen. Malaise was a prominent symptom in 32 per cent. of the patients, but probably all patients suffer from it to some extent. It was the most persistent of the symptoms. Fever and chills (30 per cent.) ceased after a day or two in bed. The fever was usually of a low grade and the highest temperature recorded was 103°F. Headache of a generalized type was complained of by 28 per cent. of patients. Dyspnea associated with substernal pain occurred in 25 per cent. and, although relatively infrequent, it was one of the most characteristic symptoms. It was probably due to extensive hilar adenitis or low grade

mediastinitis. Abdominal pain, simulating gall bladder colic was present in two cases and was due to infiltration of the lung over the right dome of the diaphragm. Erythema nodosum occurred in 4 patients and erythema multiforme in 2. The coccidioidin test gave a positive result in all cases, and in 11 the reaction was intense. The highest initial red blood cell sedimentation rate was 51 mm per hour and the average rate 32 mm per hour. The prognostic value of serological tests was not investigated.

Radiological examination of the chest showed the following types of lesion: *Diffuse pneumonia-like infiltrations*, in 83 per cent of the cases. These were usually isolated, peripheral and lobular, well circumscribed and of homogeneous density. They were usually accompanied by increased hilar shadows and sometimes by definite hilar adenopathy. Complete resolution of the peripheral infiltrations occurred in from 5 days to 3 months in some cases but in others they persisted up to 10 months and left a discrete fibrous nodule at the site of infiltration. Lesions in the lung apices simulated active reinfection tuberculosis. *Nodular parenchymal lesions*, said to be the most characteristic finding in the primary disease, were the discrete fibrous nodules representing incomplete resolution of previous infiltrations, usually of the lobular type. They averaged 2 cm in diameter, were single, isolated, well circumscribed and showed no evidence of calcification. They were equally distributed over upper and lower lobes. *Cavitation* occurred in lung nodules in two patients, in one case taking 11 days and in the other 8 months to become apparent. The cavities remained static for 5 to 10 months and were marked by their thin wall, the absence of a surrounding inflammatory reaction and their situation in the upper lobe. *Pleural effusion* occurred in 3 cases in association with parenchymal infiltrations. A minimal effusion was absorbed in 3 days and a massive one in 3 weeks.

Treatment consisted of rest in bed and treatment of symptoms.

Chemotherapy was not employed. An outstanding feature of this disease was the almost universal feeling of well-being which made the patient reluctant to accept the necessary rest treatment. J T Duncan

RITTER, F H. Tumor cerebral granulomatoso por paracoccidioides a propósito de dois casos operados. [Two Cases of Granulomatous Brain Tumour operated upon and shown to be due to *Paracoccidioides brasiliensis*] *Arquivos de Neuro-Psiquiatria* S Paulo 1948, Dec, v 6, No 4, 352-9

The English summary appended to the paper is as follows —

The author presents two cases operated on of granulomatous cerebral tumor—one of the cerebral hemisphere, and the other from the cerebellum—caused by *Paracoccidioides brasiliensis*. In both cases the preoperative diagnosis had been of brain tumor, probably glioma. Nothing in the anamnesis nor in the neurological examination gave any hints of the real cause of the disease. Even though probably rare, the solitary cerebral micomas deserve consideration when making a neurosurgical differential diagnosis in our country."

TROPICAL OPHTHALMOLOGY

TURTZ, C A. Solar Burns of Fundi. *New York State J of Med* 1948, Nov 15, v 48, 2489 [Summary taken from *J Amer Med Ass* 1949, Apr 2, v 139, No 14, 962]

Turtz observed 5 cases of burns of the retina during the past four years. Three were seen within a few days after exposure to strong sunlight. The

other 2 were seen four to six hours after exposure to sun lamps. All 3 complained of pain, photophobia and lacrimation, and all had conjunctival injection to a varying degree several hours after exposure. An early examination with the ophthalmoscope may reveal nothing pathologic or a pale spot surrounded by a brownish ring, may be seen at the fovea. Later there may be pigment deposits and a small gray punctate spot around the fovea, and this may be replaced by a hole. The prognosis should be guarded. Even though improvement may occur a positive scotoma with permanent impairment in vision usually results. The public should be enlightened as to the dangers of prolonged exposure to sunlight and the careless use of sunlamp treatments without adequate protection to the eyes.

RISQUEZ IRIBARREN R., CORDERO MORENO R. & ANDRUE J. J.
Consideraciones generales acerca de la conjuntivitis epidémica [Reflections on Epidemic Conjunctivitis.] *Rev. Med. Caracas*. 1949 Jan. v 1 No. 1. 109-23 1 map. 24 refs. English summary

In parts of Western Venezuela, notably Dabajuro Maracaibo and, further east San Felipe Chiracón and Acarigua outbreaks of conjunctivitis occurred, usually of a mild character and clearing up spontaneously. Occasionally there would be phlyctenules and corneal ulcers or some superficial punctate keratitis. The outbreaks would coincide with the early rain and a temporary abundance of mosquitoes. Cases both in 1947 and 1948, were $2\frac{1}{2}$ to 3 times as numerous in the second half of the year, that is the rainy period.

The authors discuss whether this is the same as the epidemic kerato-conjunctivitis as has been reported from the United States and due to a virus but apparently no investigations have been undertaken to confirm or refute this hypothesis. Common insects and possible vectors are *Hippelates flaviceps*, *H. depressus* and *S. plumbeus signatus*. These frequent excreta and release dumps and in the places where the outbreaks occurred sanitation is said to be primitive. The Koch-Weeks organism has been found in 40 out of 50 cases examined. (Not a very satisfactory paper. It consists of general remarks on a condition whose aetiology can be decided only by intensive laboratory studies which could not be—at all events were not—undertaken in these cases.)

|| || || ||

SARKIS L. T. Melanoderma humana e tracoma. [Melanoderma and Trachoma in Man.] *Rev. d. Biol. Colomb.* 1947 8 117-31. Ref. 5 footnotes

The author refers in general terms—no figures are given—to various places and people over the globe and puts forward the thesis that the degree of colour in the skin is protective against trachoma: the darker the skin the less prevalent is trachoma among them.

If there is anything to this theory more detailed investigation and critical studies will doubtless be undertaken to support or refute it.

|| || || ||

MOCTINO R., GILLO M. & DE MORA, S. Trucomas e trachoma de tratamento com aureomicina. First Trials of Aureomycin in the Treatment of Trachoma. *Rev. Med. Portuguesa* 1949 2 No. 2 497-503. English summary

The authors first tried an aqueous solution of urea in relation to the borate and chlorid of sodium but these proved very unsatisfactory. Their activity in 48 hours even though kept in an ice-chest. They then forewent

to make a fatty preparation whose effect could be aided by a massaging action through the eyelids. Aureomycin as a powder is quite stable and they obtained an anhydrous neutral excipient (pH 7.7) made up of equal parts of aureomycin hydrochloride and pure sodium borate, 25 mgm in each 5 gm of the ointment. This was applied every 3-4 hours for 2-10 days. Administration *per os* of aureomycin combined with the ointment locally "seems very favourable" and was well tolerated in a dose of 25 cgm every 3 hours, or 50 cgm every 6 hours. A table gives details of 15 patients in stages I to IV of the disease, their sex, age, condition before treatment was begun, the duration of the treatment and the results, with a column for remarks. With one exception the longest time of treatment was 8 days and some showed amelioration in 48 hours or even less. In brief, the results were most encouraging.

H Harold Scott

TROPICAL ULCER

GORDZIALKOWSKI, H Contribution to the Therapy of Tropical Ulcer. *Bull. Inst Marine & Trop Med, Med Acad Gdansk, Poland* 1948, v 1, No 1, 17-22

This paper is a summary, from memory, of work carried out for three years before the war in the Belgian Congo. The author's records were subsequently lost as a result of enemy action. He now points out that since he devised his method, great chemotherapeutic studies have been made but he feels that it is worthy of record owing to its simplicity and cheapness.

He considers that pure crystalline boric acid has a strong germicidal action, without destroying the tissues. After curettage of necrotic masses, the ulcer is liberally covered with the crystalline boric acid daily for three days or longer if required. Usually (except in very refractory cases requiring repeated curettage or cauterization) the ulcer was almost dry and beginning granulation on the fourth day. At this stage, spirochaetes and fusiform bacteria were absent.

Thereafter an ointment was applied, at first daily, and subsequently every other day or third day. This consisted of —

Zinc oxide	100 gm
Dermatol [Bismuth oxygallate]	100 gm
Balsam of Peru	50 gm
Vaseline	100 gm
Lanoline	50 gm
Liquid vaseline to make a paste	

This is applied in a fairly thick layer and it is claimed that it produces a rapid epidermization. Complete healing of an ulcer of 5 cm diameter occurred in 3 to 4 weeks and smaller ones healed in 2 or 3 weeks.

A description is given of a severe chronic case which eventually responded to this treatment after several months during which other forms of treatment had failed.

After several months of this treatment, the number of patients in ulcer wards in the author's hospital was halved and their average stay in hospital shortened to about one-third. The application of boric acid was usually completely painless, but occasionally was very slightly painful. Crystalline boric acid was found to exert "an incomparably better action than powdered boric acid."

Later in Poland during the war the author used boric acid in non-specific ulcers. It was quite ineffectively and occasionally even harmful but the ointment was often useful. It is therefore suggested that the boric acid has some specific effect on tropical ulcer possibly because the slightly increased acidity is unfavourable to the life and growth of specific microbes, in this case presumably spirochaetes and fusiform bacteria.

H. J. O'D. Burke-Gaffney

MISCELLANEOUS DISEASES

CARRILLO E. G. Some Cardiological Problems of the Tropics. *Amer. J. Med. Sci.* 1949 June v 717 No 6 619-26. [39 refs.]

The author has analysed 8,000 autopsies at San Juan de Dios Hospital in Costa Rica and finds that cardiovascular disease accounted for 768 deaths (9.6 per cent). The quinquennial mortality rate from this cause has risen—as it has in every country in which statistics are kept—between 1916 and 1940 by nearly 50 per cent from 84.7 to 122.3 per 100,000 inhabitants.

After remarks on the physical geography of Costa Rica, the author considers the question of heart disease under three heads: 1. The frequent causes. 2. The rarer causes. 3. The heart in relation to some tropical diseases. In the first, atherosclerosis heads the list with 4.4 per cent of all autopsies and 48.1 per cent of cardiac deaths; rheumatism coming next with 20 per cent of cardiac deaths; syphilis follows closely with 19.1 but if negroes are excluded from the list the percentage is only 13. Coronary disease is relatively rare and this is attributed by the author to the diet being deficient in fats. Among the rarer causes are mentioned pericarditis, myocardial infarction and cysticercosis of the myocardium. Acute bacterial endocarditis was seen on two occasions only but there were 19 of the subacute variety: nothing is said of the causative organism! In his remarks on the heart in relation to some tropical diseases the author says that although Chagas's disease is seen in Costa Rica he has not come across a case among the 8,000 autopsies. Ankylostomiasis is very common and the anaemia resulting therefrom may account for some of the deaths from pulmonary embolism. Ten deaths were due to bites by *Bothrops atrox* and *B. schlegelii* and in these patients there were sub-endocardial and epicardial petechial haemorrhages. In such patients during life the electrocardiograms showed a low amplitude T wave and slight depression of the ST junction in precordial lead CR5 with prolonged QT but only in those showing toxic symptoms. These changes have been found in post-viraemia and it is thought that they may be due to this cause in these patients. *H. Harold Scott*

JELLINEF D. B. Splenic Abscess in the Tropics. *J. T. P. M. J. & H. C.* 1949 July v 52, No 7 131-40 3 figs. 3 refs.

Splenic abscess may be primary, though discussible, or secondary in which the aetiology is known. The latter group may be (a) embolic (1) traumatic or (2) due to direct infection from a suppurating focus. (a) *Embolic*—The infection is carried to the spleen via the portal system as an ascending pylophlebitis with thrombosis of the plexus, or as a result of intra-abdominal suppuration. Splenic infarction is not usually recognized until revealed by autopsy. Alternatively the spleen may be infected through the systemic arteries from a primary focus elsewhere, sometimes appearing months after the original lesion has settled down. In the tropics the typhoid group of

fevers is an important factor in the aetiology and the latent period before the appearance of the abscess may be very long, 19 years has been recorded. Amoebic abscess of the spleen may be solitary or associated with hepatic abscess, infection may be *via* the portal system or direct from an adherent infected splenic flexure, it manifests itself by a high swinging temperature, tender, enlarged spleen and leucocytosis. Aspiration produces sterile anchovy-sauce pus in which amoebae are not usually found, improvement is rapid with emetine. Abscess of the spleen may occur in relapsing fever from infarction of splenic arterioles, in Egypt, EL-RAMLY [this *Bulletin*, 1948, v 45, 185] found of the spleen in 20 per cent of 139 fatal cases of relapsing fever and abscess of the spleen in 11.5 per cent. Recently L. A. NASR [*ibid*, 604] recorded seven cases occurring two or three weeks after relapsing fever, successfully treated by drainage. (b) *Traumatic* cases usually follow non-penetrating injuries with subsequent infection of a haematoma. (c) *Direct infection* may occur from spread of a suppurative process in an adjacent viscus, e.g., leaking gastric ulcer, perinephric abscess, etc. the onset may be sudden or insidious and may be overshadowed by the symptoms of the causative infection. Pain in the left hypochondrium, worse on coughing and radiating to the left side of the chest is the most constant symptom, fever is usually high, but in chronic infections it may be slight. The spleen is enlarged and tender, and in late cases may be adherent, the abscess pointing through the abdominal wall. Physical signs in the chest, pleural effusion and raising of the diaphragm with displacement of the heart on radiography are common. Treatment is by aspiration, followed by penicillin, with drainage by the abdominal route if this fails.

Primary abscesses have been reported more frequently from the tropics than elsewhere. WALLACE in N Rhodesia has recorded 49 seen in two years, 19 of these were diagnosed and drained, with an 80 per cent recovery rate. Onset was sudden with fever and rapid enlargement of the spleen, which at operation was found to be adherent to the abdominal wall. The abscess cavity contained gas and up to eight pints of pus, usually sterile, and no amoebae were found. Laboratory examinations were negative for typhoid, undulant fever and syphilis. Thrombophlebitis of the leg veins developed later in a high percentage of cases, sometimes associated with intestinal thrombosis. Cases have been reported from other parts of the tropics. Two cases which were successfully treated are described. The author considers that the most probable aetiology is slight injury to a spleen already enlarged and vascular from malaria or other cause, producing subcapsular haemorrhage, which later becomes infected. Thrombosis of the splenic vein producing colliquative necrosis is probably an important factor in some cases.

W L Harnett

CRUICKSHANK, J C. **Failure of Aureomycin in Experimental Mollidosis** *Brit Med J* 1949, Aug 20, 410-11

Generalized melioidosis is almost invariably fatal, and recovery usually occurs only in those cases with localized superficial abscesses. Although no satisfactory therapeutic agent has yet been described, varying degrees of success and failure have been reported with certain sulphonamides and antibiotics. chloromycetin (chloraphenicol) has been shown to be highly inhibitory to *Pf whittmorei in vitro*. The author discusses these various reports, as summarized by GREEN and MANKIKAR [this *Bulletin*, 1949, v 46, 498] and then describes a small laboratory trial of aureomycin in the experimental treatment of the disease.

Tests of the inhibitory action of aureomycin *in vitro* were made after the method of PAINE *et al* [see *Bulletin of Hygiene*, 1949, v 24, 274], and the

technique is described. The final concentration of aureomycin ranged from 100 to 0.4 $\mu\text{gm.}$ per ml. Strains of *Str. pyogenes* and faecal *Bact. col.* were tested in parallel. A table shows the results, which indicate that *Pf. whitmorei* was inhibited by 1.5 $\mu\text{gm.}$ per ml. of aureomycin in broth and by 6.3 $\mu\text{gm.}$ per ml. on a plate—its sensitivity was more closely related to that of *Bact. col.* than to that of the haemolytic streptococcus. It is pointed out that levels up to 2 $\mu\text{gm.}$ per ml. may be obtained in the blood four hours after a single oral dose of 500 mgm. in healthy persons—this falls in 12 hours to about 0.49 $\mu\text{gm.}$ per ml. (see SCHNEIDERSON & TORANSKY *Bulletin of Hygiene* 1949 v. 4 8-9).

A small and rapid preliminary *in vivo* test was then made in guinea-pigs and Professor Cruickshank points out that its limited nature had the advantage of reducing the number of persons exposed to laboratory animals with this reputedly highly dangerous organism. Great care was taken to minimize the hazards.

Nine different infecting doses of *Pf. whitmorei* (from 500 million to 5 organisms) were injected into groups of guinea-pigs, half of which were treated intraperitoneally with aureomycin morning and evening from the time of infection to the end of observation. The dosage varied from 1 to 4 mgm.

The results are shown in a table—the strain was very virulent and death occurred in 4 to 11 days according to the infecting dosage. There was little difference between the treated and control animals, in respect of the typical lesions produced or in the fatal course of the disease—the slightly longer survival time of some of the treated animals was not significant.

The *in vitro* tests did not suggest that larger doses of aureomycin would be likely to be beneficial—and the dosage and spacing actually used conformed with those found effective in other infections, e.g. Weil's disease.

It is evident that aureomycin did not materially influence the course of experimental melioidosis in guinea-pigs. H. J. O'D. Burke-Gaffney

GELFAND M. Some Peculiar Cases of Gangrene and their possible relationship to Tropical Phlebitis. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949 July v. 43 No. 1 75-8, 9 coloured pls.

Gelfand has already shown this *Bulletin* 1949 48 575 that tropical phlebitis there may be a simultaneous spasm of the artery or arterioles corresponding to the affected vein which is an essential part of the cause of the oedema which accompanies the phlebitis. He found that this oedema disappeared if the influence of the sympathetic nervous system in the arteries was eliminated by local injections of procaine. He now reports two cases of gangrene of the fingers following pain and swelling in which the lesion was probably a primary phlebitis with associated arteriole spasm. In both the radial artery could not be palpated though the brachial artery was pulsating normally. The patients were Africans aged 44 and 15 years respectively and were otherwise healthy.

As an illustration of the fact that thrombophlebitis complicating acute infections may also lead to gangrene the author quotes the case of an African child with pneumonia and gangrene of one foot. The gangrene in this case could best be explained as due to thrombophlebitis with arterial spasm for the arteries of the affected foot could not be felt though the popliteal artery was pulsating. The first two cases were probably of primary phlebitis, the last was most probably secondary. C. H. B. Brooks

ANGRISANI, V Cinque casi di Ainhum riscontrati sul Gebel Nefusa
Considerazioni sulla etiopatogenesi dell' "Ainhum" vero e proprio
[The Aetiology of Ainhum Five Cases seen in Gebel Nefusa (Tripolitania)]
Boll Sanitario d Tripolitania 1949, Apr-June, v 7, No 2, 17-22, 2 figs
English summary

The author has seen five cases of ainhum in one district of Tripolitania in a single year, three in adult male arabs and two in immigrants from Fezzan, one of them an elderly woman (? 67 years) The last is reported in detail, but it was quite typical and need not be repeated here The author then tells how writers of a long time ago used to speak of syphilis or leprosy or yaws or syringomyelia as causes of the condition and, later, of ainhum as occurring in, though not aetiologically connected with, syphilis, leprosy, etc He considers each of these in turn and concludes that any slight trauma may initiate the lesion and subsequent inflammation of low-grade result in the formation of a constricting fibrous band or ring which cuts off the nervous and vascular supply until the tissues are destroyed and that ainhum is just a fortuitous surgical condition in countries where the inhabitants go about barefoot *H Harold Scott*

FLOCH, H & DE LAJUDIE, P Pseudo-myiase rampante en Guyane Française
[Creeping Eruption in French Guiana.] Institut Pasteur de la Guyane et
du Territoire de l'Inini Publication No 134 1946, Sept, 4 pp [22 refs]

The authors have already reported three cases of creeping eruption in French Guiana and they now report three more, seen in 1945

The first, in a boy of 14, was on the inner surface of the left knee, the second, in an adult, on the right palm and wrist, and the third, in a European adult, over the left internal malleolus No causative parasite could be found by dissection

The authors discuss the literature and principal features of creeping eruption at some length *H J O'D Burke-Gaffney*

HORTON, S H, Jr Creeping Eruption Report of a Case with Loeffler's
Syndrome U S Nav Med Bull 1949, July-Aug, v 49, No 4, 703-6,
5 figs

"1 A case of creeping eruption with associated Loeffler's syndrome is reported

"2 The larvae were effectively eradicated with fuadin and ethyl chloride spray

"3 In all cases of creeping eruption serial roentgenograms of the chest should be taken as this is the only means of confirming the transient pulmonary infiltrations"

ENTOMOLOGY AND INSECTICIDES GENERAL

DONOSO BARROS, R Un caso de myiasis digestiva en Chile Consideraciones
sobre una nueva etiología, *Lucilia Caesar* (Linnaeus) 1758 (Nov Sp in
Fauna Chilensis) [A Case of Intestinal Myiasis in Chile Notes on *Lucilia*
caesar, a Species New to Chile] Rev Med Chile 1949, Mar, v 77, No 3,
209-11 [12 refs]

The following is a translation of the author's summary —

The author reports for the first time a case of symptomless intestinal myiasis caused by larvae of *Lucilia caesar* (Linnaeus) 1758, a species newly recorded

GEIGY, R. L'hypertrophie parasitaire de la femelle de *Tunga penetrans* [The Hypertrophy of the Female *Tunga penetrans*] *Bull Soc Path Exot.* 1949, v 42, Nos 3/4, 123-5

The author has studied the swelling of the female chigger flea, *Tunga penetrans*, and describes the process step by step. The great expansion of the membrane between the second and third abdominal segments and the lesser expansion of the membrane between the first and second is not a simple dilatation but a multiplication of the cells to accommodate the enlarging intestines and Malpighian tubules. At the same time the powerful muscular system is being adjusted and built up to support these enlarged organs and to counter the pressure provoked by them. Contrary to what was expected, the developing of the ovarioles and the ripening of the eggs does not occur simultaneously with these developments, but forms the second half of the process of enlargement, moreover, the eggs do not develop one at a time as in other fleas but in batches of seven to ten, all the eggs in one lot maturing together. *H S Leeson*

BUTTNER, A. Refixation accidentelle d'un mâle de *Hyalomma excavatum* sur l'homme [Accidental Attachment of a Male *Hyalomma excavatum* to Man] *Ann Parasit Humaine et Comparée* 1949, v 24, Nos 1/2, 186-7

Though ticks of the genus *Hyalomma* are mainly of veterinary interest they have from time to time been recorded on man, but they have commonly been identified as *H. aegyptium*. Laboratory workers have recorded this tick and related species as being capable of causing pathological effects in man, but the author points out that identification of species within this genus presents certain difficulties because of resemblances and variations among them, nevertheless, he wishes to place on record that, in 1948, while engaged in rearing *H. excavatum* on sheep at Richelieu Indre-et-Loire, France he found a male tick on himself and that he tried unsuccessfully to induce other ticks to attach themselves. *H S Leeson*

THÉODORIDÈS, J. Les coléoptères parasites accidentels de l'homme (Note complémentaire) [Coleoptera as Accidental Parasites of Man] *Ann Parasit Humaine et Comparée* 1949, v 24, Nos 1/2, 110-15 [12 refs]

In continuation of his previous paper [this *Bulletin*, 1949, v 46, 785] the author lists eighteen species of beetles or their larvae reported as having been found in the human body or passed out from the intestines. In particular he quotes more records concerning *Tenebrio molitor* and *Blaps mortisaga* and discusses the evidence in one case where a woman was reported to have passed per anum three larvae of *Ptinus tectus*. *H S Leeson*

MINISTRY OF AGRICULTURE AND FISHERIES. Specifications and Methods of Analysis for certain Insecticides and Fungicides. Technical Bull No 1, 64 pp 1949 London H M Stationery Office [1s 3d]

KLATING, A F H. A Hundred Years of Insecticides and Repellents in the Army. (A Historical Summary) *J Roy Army Med Corps* 1949 June v 92 No 6 290-312 [39 refs]

BHATTACHARYA, J. Studies in Compounds of the DDT Type. Part I. *Ann Biochem & Exper Med Calcutta* 1949 Jan-Feb v 9 No 1, 5-6

BHATTACHARYA, J. DUTT, A K, BHOWMIK, H & RAY, S N. Studies in Compounds of the DDT Type. Part II. *Ann Biochem & Exper Med Calcutta* 1949 Jan-Feb, v 9, No 1 7-8

LABORATORY PROCEDURES

EL HOSNY M. L. A Simple New Stain for Intestinal Protozoa. *J. Roy. Egyptian Med. Soc.* 1949 May v 72, No. 5 428-8.

Quercitrin is a three-sammonose glycoside and is one of the most widely distributed natural pigments. It occurs in many plants, such as horse-chestnut, vine leaves, hops and tea and in the brownish outer skin of the Egyptian onion, *Allium cepa*.

An infusion of this skin, prepared by boiling it until a deep brownish colour is obtained, may be used for staining of intestinal protozoa. It may be used immediately without ripening mordant or differentiating solutions. On storage of the infusion, some sediment occurs but this does not interfere with staining.

Coverslip preparations of infected stool are fixed in Schaudinn's fluid for about 25 minutes and transferred to 70 per cent. alcohol and a little iodine (Weigert Lugol's iodine) for 30-60 minutes. After two changes in pure 70 per cent. alcohol, the slip is transferred to the dye solution which is diluted with 70 per cent. alcohol (staining solution, four parts alcohol, one part dye) for about two hours at 37°C. or preferably overnight. Undiluted stain may be used and staining also occurs at room temperature. The coverslip is then washed in several changes of running tap water left in it for about four minutes dehydrated, cleared and mounted.

It is stated that the stain shows great selectivity and contrast between the cell elements and it is claimed that in selectivity and contrast as a nuclear stain, it gives results equal if not superior to the well known haematoxylin solutions.

H. J. O. D. Burke-Gaffney

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. A Note on some of the Scientific Studies undertaken by Members of the Colonial Medical Service during the Period 1930-47 with a Bibliography Miscellaneous No. 513. 47 pp. 1949 The Church House Westminster S.W.1. Summary appears also in *Bulletin of Hygiene*.

The anonymous author of this note introduces his brief surveys of the various branches of medical enquiry which engaged the attention of the Colonial doctors, by observing that the volume of published papers written by those doctors is 'far from negligible'. This is borne out by the 23 pages of references given to the titles of those papers and the journals in which they were published. 157 of them were published in the *Transactions of the Royal Society of Tropical Medicine and Hygiene* and no less than 494 in the *East African Medical Journal*. At the same time however he makes the important point that most of the records of routine clinical, laboratory and preventive duties are to be found in departmental papers dealing with specific local problems. For instance, some of the most valuable information on trypanosomiasis is to be found in the *Annual Medical Reports of the African territories*. The pioneer work of Dr. G. Mackenzie when he was Sleeping Sickness Officer in Tanganyika Territory is a case in point.

The author also makes the point that laboratory facilities are limited in the tropics (though there are excellent research laboratories at Lagos, Entebbe, Nairobi, Kuala Lumpur and a few other places in addition to the laboratories for routine work in the various countries). This being so much of the work

which required refined techniques has been done outside the Colonies themselves, in laboratories in Britain and elsewhere, and by scientists not members of the Colonial Medical Service, when facilities improve, however, it may be expected that the opportunities for work on the spot will attract research workers to the Service. But laboratory work is not enough, and "the last word must come from the records of happenings in the field", it is in this sphere that so much of the valuable work here recorded has been done. Much of it has been tedious, carried out under difficult physical and mental conditions, in countries where vital statistics as we know them do not exist, and where continued observation of communities is almost impossible in the detail needed for statistical analysis.

The author gives short summaries of the important work done in the period 1930-47, on the following groups of subjects—Nutrition and Deficiency Diseases, Malaria, Trypanosomiasis and Tsetse Flies, Plague, Tuberculosis, Leprosy, Yellow Fever, Rabies, Typhus, Helminthology, Haematology, Blackwater Fever, Neurology and Psychiatry, Pathology, Miscellaneous Studies. These short accounts should be read to be appreciated—they can hardly be condensed.

It would be a mistake to think that the investigations carried out in the Colonies have exclusively concerned the diseases conventionally regarded as tropical. This is by no means the case, and the sections on Nutrition, Tuberculosis, Neurology and Psychiatry, Pathology, and Miscellaneous Studies cover a very wide field. It is well known to those who have served in the tropics that half the troubles are non-tropical, but the tropical diseases have always rewarded research and have usually attracted it rather more than the rest.

A technical point on the bibliography is perhaps worth mention. When two or more authors have published a paper, the full reference will be found under the name of the first author, but not under the names of the others (the bibliography is in alphabetical order of first authors' names). For instance, two papers by OWEN and HENNESSEY are cited under O, but in the list of papers by HENNESSEY (under H) there is no indication that he had collaborated with OWEN, similarly the monograph by POYNTON and HODGKIN is cited under POYNTON but not under HODGKIN, NIVEN's work largely (but not entirely) appears under FIELD and NIVEN. This has the advantage that it does not swell the list by duplication of references, but it has the disadvantage that it is not possible to be sure that all papers published by one person appear in one place. There are certain other features of citation which could be improved.

This modest publication is an account of an impressive amount of good work done in a period which includes the recent war, it is doubtful if any other medical service of comparable size could show a better record.

Charles Wilcocks

BARRETT, R. H. **Health Regulations for Air Travel (III)** *Brit Med J* 1949, Aug 6, 329 [Summary appears also in *Bulletin of Hygiene*]

In October 1948 an Expert Committee on International Epidemiology and Quarantine met in Geneva, and considered a revision of the International Maritime and Aerial Sanitary Conventions, which are to be replaced by WHO Sanitary Regulations. The Committee adopted a liberal attitude, in the direction of relaxation of some of the existing restrictions. Certain principles were proposed on which the WHO Regulations for air travel will be based, as follows—

'1 *Plague and Typhus Inoculations*—These inoculations will not be required of travellers by the new regulations. It was considered by the committee that the use of new insecticides and rodenticides now available should be the most effective method of dealing with outbreaks of these diseases.

2. *Cholera Vaccination*.—This inoculation will not ordinarily be required of travellers but it will be permissible for individual Governments to require it of passengers coming from local areas infected with cholera.

3. *Transit Passengers*.—Air passengers in transit through foreign airports will not be subjected to any sanitary measures in force for that locality—e.g. compulsory inoculations or vaccinations—provided that they are not suffering from an infectious disease and that they do not leave the precinct of the airport. A passenger will not be considered to have left the airport if he is conveyed to another airport in the same vicinity under the supervision of the health authorities.

4. *Immunization of Travellers*.—The committee's views on the subject of immunization of travellers as a quarantine measure are worth quoting at length.

The committee noted that there had developed since the last war a widespread tendency on the part of health administrations to require from travellers certificates of immunization, irrespective of the value of such immunizations for the protection of the countries reached by the travellers or for that of the travellers themselves.

The committee was aware of the many advantages inherent in the compulsory production of immunization certificates, and considered that the serious obstruction to free and rapid travel caused by such requirement was out of all proportion to the protection likely to be afforded to the country of arrival.

5. *The Personal Declaration of Health*.—This document was compulsory for air travellers in the 1944 Sanitary Convention for Aerial Navigation but its use under the WHO Regulation will be optional at the discretion of individual Governments.

In future the statutory immunizations apart from those required for personal protection (i.e. TAB) will be for smallpox and yellow fever only, with cholera immunization as an occasional measure.

The author mentions and deprecates the excessive quarantine precautions taken in some of the countries of the Near East during the typhoid epidemic of 1947.

For previous communications see the series in *Bulletin* 1948, 45, 17, 1949, 46, 413. (Charles H. Cook)

WORLD HEALTH ORGANIZATION. *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Sixth Revision of the International Lists of Diseases and Causes of Death Adopted 1948. Vol. 2. Bull. World Health Org.* Geneva 1948. Suppl. 1 pp. xv + 776. Review appears also in *Bulletin of Hygiene*.

The old *International List of Causes of Death* simply presented a list and did a great deal of thing under no clarity of national and international reporting. From time to time of course it has been necessary to revise the list and the World Health Organization has now issued volume 2 of the sixth revision (1948). Volume 1 will comprise the introduction and the first ten years of the list.

The introduction contains a historical review of the classification and a statement of the methods adopted by the committee appointed to make the changes in the classification of 1948 together with some 153 figures of fatal cases of injury and poisoning for characterization purposes. This occupies pages 4 to 47 and comprises three light tables. It is followed by much more extensive four-digit list based on the same figures, but extended. This occupies pages 48 to 72 and is followed by supplementary tables to show the instructions for medical certification and notes

on the rules for classification, by special tabulation lists (including lists of 150 and 50 titles), a suggested form of multiple-cause tabulation, and by the Regulations on Nomenclature adopted by the World Health Assembly

In the introduction the purpose of a statistical classification is defined, it is "to provide a list of disabilities for compiling statistics and not a nomenclature of diseases and injuries. In other words, not every condition receives a particular rubric or number, but there is a category to which every condition can be referred"

The *Manual* has evidently been prepared with great care, and in an accompanying notice issued from Somerset House there is a short indication of the procedure by which the sections were submitted to practical tests on both sides of the Atlantic, and to the detailed scrutiny of various committees

Some of the sections in the list of infective and parasitic diseases, however, should perhaps be amended when a new edition is produced. For instance, the old division of leprosy into lepromatous leprosy, neuroleprosy and mixed, has now been superseded, by international agreement, and the terms lepromatous, tuberculoid and undifferentiated have been adopted. The difference is more than a change of names. Under the heading schistosomiasis the subdivisions vesical (*S. haematobium*), intestinal (*S. mansoni*) and pulmonary (*S. japonicum*) should be discarded in view of the fact that the symptoms of *S. japonicum* infection are largely intestinal, and that the rare pulmonary manifestations can also be caused by *S. mansoni*. The filarial diseases are not differentiated except that onchocerciasis is mentioned separately, and infections with such diverse filarial worms as *Wuchereria bancrofti*, *W. malayi*, *Loa loa* and *Acanthocheilonema perstans* must all be placed together under filariasis. There are other minor points in this section which could be modified with advantage

Charles Wilcocks

WASHINGTON Proceedings of the Fourth International Congresses on Tropical Medicine and Malaria, Washington, D C, May 10-18, 1948 Vol I pp xiii+1-946 Vol II pp viii+947-1810, numerous figs & pls 1948 Washington U S Govt Printing Office

The Abstracts of these Congresses, of which the present two volumes represent the detailed Proceedings, have already been reviewed at length [this *Bulletin*, 1948, v 45, 1126]

The appearance of the full records of the Congresses indicate even more strikingly the immense range of the programme and of the papers that went to make it up and this additional review is intended to provide readers with further details of the subjects discussed and the nature of the meetings as a whole

The Proceedings are reproduced in two handsomely bound and printed volumes, each covering some 900 pages. The first 100 pages deal with such general matters as the business of the opening plenary session, the reports and resolutions eventually arrived at, the presentation of the Laveran prize to Professor H. E. SHORTT and of the Walter Reed Medal to Professor N. H. SWELLENGREBEL, a number of addresses and speeches, including the address of welcome by the Honourable George C. MARSHALL, Secretary of State, and the brilliant and penetrating after-dinner address by Dr L. W. HACKETT. This part of the Proceedings also contains a full account of the Commemoration of the Demonstration by Walter Reed of the Mosquito Transmission of Yellow Fever and the Commemoration of the Fiftieth Anniversary of the Discovery by Ronald Ross of the Method of Transmission of Malaria. Finally, the introductory chapters give a list of officers, committees, rules of procedure and the general programme

There then follow the reports of papers in the 12 sections which make up the bulk of the two volumes. The Proceedings close with the minutes of three special conferences held during the Congresses at the suggestion of representatives of the World Health Organization to discuss respectively problems of malaria, plague and schistosomiasis with an account of scientific and technical exhibits and institutions visited and with a complete list of participants in the Congresses. At the end of the second volume there is a complete index of authors of the various papers.

Some idea of the nature of the subject discussed may be obtained from the following list of sections with notes of some of the principal subjects dealt with in each. It would be impossible in a short space to list each paper or its author but each subject was dealt with by one or more well known experts whose names will be familiar to readers of this Bulletin in association with the subjects concerned.

Research and Teaching Institutes—Papers in this section referred separately to facilities in Africa, the Far East, Australia, the Americas and Europe.

Tropical Climatology and Physiology included physiological adaptation of dwellers in the tropics, deterioration and nutrition, climatology and human settlement in the tropics.

Bacterial and Spirochetal Diseases dealt with *tuberculosis* (including BCG, X-ray diagnosis and streptomycin treatment), *syphilis* and *chlamydia* (including penicillin treatment), *plague* (epidemiology, ecology, vaccination, antibiotics), *enteric diseases*, *cholera* and *electrocardiography* (the last named illustrated with some striking photomicrographs), *leptospirosis*, *tropical environment* and *fluence on infectious disease* and *leptospirosis* (with particular reference to new developments in therapy).

Viral and Rickettsial Diseases included papers on viruses in general, rickettsial diseases in particular areas, their treatment with *hydrocortisone* and the use of vaccines. Other sub-sections contained papers on *infectious hepatitis* its aetiology and epidemiology, *epidemiology and control of dengue fever*, *dengue and sandfly fever*, *poliovirus in the tropics*, the *rhinovirus*, *encephalitis* and *ber*.

Malaria constituted a long section of some 350 pages, made up of 6 sub-sections and nearly 40 separate papers. It covered all aspects of the subject giving up-to-date information on parasite-host relationships, entomology, chemotherapy with the newer drugs, immunity, control and global epidemiology.

Helminthic Diseases was concerned particularly with the physiology of helminths and their relationship to their hosts and the epidemiology and pathology of helminthic diseases. *filariasis* and *schistosomiasis* were especially dealt with and new methods of chemotherapy and control discussed.

Protozoan Diseases obtained a whole sub-section on the epidemiology, physiology, pathology and chemotherapy of *malaria* and included much information on experimental work. The second sub-section dealt principally with *leishmaniasis* and *trypanosomiasis* both African and South American.

Nutritional Diseases—the Tropics formed an important section comprising some 80 pages. It covered nutritional problems and specific deficiency diseases in several tropical areas.

Tropical Dermatology and Mycology discussed work on tropical mycoses and included papers on present knowledge of *histoplasmosis*, *coccidioidomycosis* and *South American blastomycosis*. It also dealt with *unilateral keratitis* and *dermatomycosis*.

Tropical Vectors and Parasites covered a wide range of subjects including protozoan, viral, helminthic and bacterial metazoa in the tropics.

World Health Council and other sub-sections dealing respectively with *international research*, *health administration*, *the tropics and the world health system*.

in the tropics and public health and vital statistics problems. This section contained a large amount of information on services and organization in being and proposed.

Medical and Veterinary Entomology represented a section of some 170 pages, with four sub-sections. The first dealt with *mosquitoes and disease*, the second with *flies*, the third with *ticks, mites, lice and fleas* and the fourth with *triatomata, insecticides, toxicology and equipment*. This important section covered various regional aspects of entomological control and epidemiology and a great deal of information on the nature, toxicology and use of insecticides.

The volumes contain a number of excellent photographs and other illustrations.

These notes give a very brief account of a monumental piece of work. The wide range of subjects covered, the vast amount of up-to-date information contained and the distinction of those contributing to the Congresses are not only evidence of the success of the Congresses themselves, their record in two large volumes has resulted in what is in fact a large compendium on recent advances in tropical medicine and hygiene, to which all workers in tropical diseases can turn for reference with advantage and profit.

H J O'D Burke-Gaffney

AFRIQUE OCCIDENTALE FRANÇAISE. Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1947 [DURIEU, C.] [Technical Report of the Pasteur Institute in French West Africa in 1947] 128 pp 1949 Dakar Grande Imprimerie Africaine

This Report is on the lines of its predecessors [this *Bulletin*, 1949, v 46, 416]. The following points of special interest are noted.

The total number of specimens examined increased to 37,354 of which 18,162 were bacteriological, cytological and parasitological, 14,943 were serological, 3,782 chemical and 425 histopathological [the last-named are incorrectly shown as 14,943, the figure for serological examinations]. The Institute issued 19,368 ampoules of 6 cc each of rabies vaccine during the year. There were 49 anti-rabic treatments at the Institute and 473 at the other centres, with no deaths or paralytic accidents. It is added, however, that six deaths from rabies were reported which occurred in 1946—one each from French Sudan, Dahomey and Senegal and three from Togoland. Detailed statistics are given of the anti-rabies service and brief accounts of the cases referred to above.

A lengthy report is given of a transient paralytic condition which occurred in a European, and which lasted about a fortnight, after inoculation with a vaccine from Yaba, Nigeria. Bacteriological tests and animal inoculations from this vaccine failed to show any evidence of any neurotropic virus or other pathogen.

Vaccines and other biological products prepared at the Institute in 1947 amounted to over eight million doses or cc.

Vaccination against yellow fever was carried out in 3,109,638 cases. Yellow fever occurred only in Sudan—there was a small focus at Bamako which accounted for three European deaths. Prompt measures rapidly eliminated this focus.

Mention is made of a follow-up investigation carried out at the Swiss Tropical Institute at Basle on 476 persons who had received the Dakar Institute yellow fever vaccine. A short-lived reaction with mild pyrexia was found in 120 (25.2 per cent), a more severe reaction in 32 (6.7 per cent) and no appreciable reaction in 324. Later tests in Dakar showed that these persons had developed a solid immunity. Serum protection tests were carried out on 260 human and 47 animal sera. In two cases the tests were made for diagnostic purposes. Both patients showed, clinically, features suggestive of yellow fever, although

both had received yellow fever vaccine and both died. One patient (a European) who had been vaccinated previously at Marseilles gave a negative test but yellow fever virus was isolated and at autopsy typical liver lesions were present. The other (an African) gave a strongly positive protection test on the third day and autopsy showed that the condition was infectious hepatitis.

Lengthy details are given of protection tests carried out to control yellow fever infection. An epidemiological enquiry was made in two towns on the Coast of French Somaliland, where protection tests were carried out on 100 Africans—only two were positive & both in Africans, one of whom had been certainly and the other probably vaccinated against yellow fever.

Among the 47 animals tested (all but one being baboons, *Papio papio*) there were five positive serum protection tests—all in animals from Guinea.

Among the special investigations referred to in the report is a lengthy discussion on the therapeutic properties of cinchona—this subject has been discussed at length in this Bulletin (see above).

There are also discussions on tick-borne relapsing fever in Senegal and the rat as a reservoir. Of 51st rodents and insect-bites examined at Dakar 85 (19.55 per cent) were infected with *S. duttoni* especially *Cricetomys gambianus* and *R. rattus merriami*—the local vector is *Ornithodoros erraticus*.

A number of records are given of vitamin A estimation in Africans in Dakar and of vitamin C in the fruit *Detar* (*Detarium senegalense*) which contains about 2 per cent of the vitamin—some of these have already been referred to in this Bulletin (1919 v 46 1931).

An interesting study is reported on the chemical composition and caloric value of termites which are eaten extensively by certain African tribes. It is shown in tables that living termites contained 24.25 per cent fat, 23.22 per cent protein and a caloric value 1,747 per 100 gm. corresponding figures on cooked (fried) termites were 33.15, 45.62 and 5021. Corresponding calories for beef and dried salted fish (quoted from TIMON) and ground nut (MULLAND) are given as 1,77, 203 and 584 calories.

The Report ends with an account of the experimental situation at M'Elmor and three pages of listed publications by members of the staff of the Institut.

H. J. O'D. B. Le Gallier

BULL. INST. HYG. MAROC, 1947 v 7 125-32. Rapport sur l'activité de l'Institut d'Hygiène pendant l'année 1947. Annual Report of the Hygiene Institute, Morocco for 1947.

In the Institute 28,347 microbiological and other medical laboratory examinations were made in 1947. In addition to these 458 histopathological and over 1,000 chemical examinations were undertaken.

Epidemiological services included a scheme for vaccination of the population against smallpox every four years studies of the measures to prevent the introduction of cholera into Morocco and investigations on schistosomiasis.

Six anthelmintic missions were an operation in the country during the year and were concerned with ascarid infested breeding places, control mass treatment and general epidemiology.

It is recorded that *proteus* was determined in the case of 3 febrile nephropathy cases and 718 adults. The predominant species of malaria was *A. maculiparvus* (presumably *A. schicki*) (79 per cent) of which *A. turkestanicus* accounted for 28 per cent, *A. latrans* 1 per cent and *A. setaceus* 10 per cent. Other species were *A. malayensis*, *A. mearnsi* and *A. concolor*.

Parasites were found in 2,008 (19.07) blood films of 12,438 persons 53 per cent *P. falciparum* 34 per cent *A. mearnsi* 13 per cent.

Studies have shown that *A. turkestanicus* which spread, but its vector is not clearly established. The same view is expressed regarding *A. setaceus*.

[see also this *Bulletin*, 1949, v 46, 317] It is stated that *A. claviger* is a notable vector at high altitudes, but is stated to be without danger below an altitude of 1,000 metres, because its development ceases before the temperature allows sporocysts to develop [See also this *Bulletin*, 1949, v 46, 432]

A brief note is given on air-spraying with larvicides and on the treatment of malaria with the newer synthetic products. It is noted that doses of proguanil [paludrine] between 0.3 to 1 gm daily resulted in disappearance of *P. malariae* from the peripheral blood only in 6.5 to 11.5 days (average 9), in 12 cases while in 28 cases of *P. falciparum* and 20 of *P. vivax* infections, the same dose produced disappearance of the parasites in 2.4 and 3.9 days respectively.

Biochemical studies included investigations on cholinesterase and the refractive index of serum. It is stated that both are lowered almost constantly in malaria and that quinine, quinacrine [mepacrine], nivaquine, and paludrine [proguanil] all have a definite anti-cholinesterase activity [but no details are given].

The anti-tuberculosis service was interrupted for several months, but tuberculin tests and radiographic examinations were made on 12,583 persons in urban areas (Fez) and rural areas (Merchouch and Skoura du Guigon). A summary of the results is shown in a short table.

H. J. O'D. Burke-Gaffney

BULL. INST. HYG. MAROC 1947, v 7, 133-94. Rapport sur l'activité des Services de la Direction de la Santé Publique et de la Famille pendant l'année 1947 [Report on the Activity of the Public Health and Social Welfare Services during 1947].

Public health conditions in Morocco in 1947 were much more satisfactory than during the previous two years. The disasters of 1945, drought, famine, malnutrition and an epidemic of relapsing fever, were still affecting health conditions in the early months of 1946. Relapsing fever was declining, however, and had practically disappeared in August 1946. In 1947 typhus fever had also a much lesser incidence, only 126 cases were reported. Deaths in 1947 numbered half those in 1946 and only a third of the 1945 figure.

Consultations in hospitals and dispensaries in 1947 numbered 9,654,876, wounds 38.5 per cent, fevers 42, and venereal diseases 19 per cent. Admissions to hospital numbered 89,000.

Vital statistics are available only for the 18 municipal towns. Data for Europeans are exact, for the Jewish population approximately correct, for the Musulman population unreliable. The Musulman population of these towns is largely a floating one. The death rates per 1,000 in 1947 were Europeans 8.5, Jews 15, Musulmans 15, as compared with 10, 19.8 and 36 in the very unhealthy year 1945. More than half of the Jewish deaths and a third of the Musulman deaths were those of children under two years of age.

Trachoma is very prevalent, new cases treated in 1947 numbered 87,232. Only 61 cases of smallpox were notified against 1,870 in 1946. Measles is an important cause of infant mortality. There were 68 cases of scarlet fever notified but none fatal. Diphtheria notifications numbered 334, the fatality rate was low. Seven cases of anterior poliomyelitis and 29 cases of cerebrospinal meningitis were notified. Tuberculosis is widespread. There were 183 new cases of leprosy of which 64 were in the Fes-Taza region. Typhoid-paratyphoid infections were less in evidence, 902 cases as compared with 1,579 in the previous year. These diseases are essentially urban, affecting chiefly the European and Jewish elements of the populations.

There were only 19 sporadic cases of relapsing fever, tick-borne. The 126 cases of exanthematic typhus were the lowest number ever recorded. The increasing use of DDT probably contributed to this decrease, 216,000 anti-typhus

vaccinations were performed. The last case of plague occurred in October 1915. 124837 rats were captured. There was no cholera—the outbreak in Egypt necessitated special precautions.

The report gives detail of new hospitals under construction including a tuberculous sanatorium of 280 beds, in the hills and a tuberculosis pavilion of 100 beds at a hospital at Casablanca. November 1944

Cook, C. F. *The Native in relation to the Public Health.* *M. J. J. Austral* 1919 Apr 30 v. 1 No 18 569-71

The author, than whom there is probably none more experienced in the problems of their relationship to Europeans and Western civilization traces the changes in the life of the Australian aborigines in the less settled part of western and northern Australia, from their unclothed food-gathering nomadic existence when the continent was discovered to the present position, which is further complicated by an increasing half-caste population. In their original condition the scarcity of food necessitated their constant wandering over wide areas in small groups. This effectively prevented the development of epidemic infections and at the same time excluded them from developing any empirical preventive medicine. European occupation in the areas concerned is still very sparse but has from the start always encouraged the settling of the aborigines round homesteads and townships to reduce disturbance and killing of their stock and to have labour readily available. This new mode of life offered a virgin field for infections and epidemics and is usually associated with unsanitary conditions and squatter.

In the inevitable and present close contact of aborigines, half-castes and Europeans the author recognizes a grave health problem, particularly as regards leprosy, ankylosing spondylitis, amebiasis, malaria and tuberculosis.

Clearly the adaptation of the native to community life and his successful integration into the white social structure are public health problems of the first importance. "No government department is more stultified and more suitably equipped for attempting the solution of the problems arising from this failure to orientate the native component into the nation's general population than that of public health."

The author then deals with the necessary measures. These include broad education of both sections of the population, adequate housing of aborigines and half-castes, and special but fundamental requirements for the northern areas. He admits that the cost would not be light and in the absence of popular demand its financing from State or Federal budget will be difficult.

Should public health requirements not weaken popular opinion the author points out that uneducated bewildered, without a place in the social structure—the native hybrid must remain a ready prey to agitators and a fertile field for subversive ideologies. That this section is rapidly increasing in numbers and may soon dominate the population in isolated areas. It is a further emphasis from the point of view of national defense. (Continued from 1942.) C. J. Hackett

BOOK REVIEWS

DÉVÉ, Félix. *L'échinococcose osseuse* [Hydatid Disease of the Bones]
236 pp, 30 figs 1948 Paris Masson et Cie, 120 Boulevard Saint-Germain
[700 fr]

— *L'échinococcose primitive* (Maladie hydatique) [Hydatid Disease]
362 pp, 63 figs 1949 Paris Masson et Cie, 120 Boulevard Saint-Germain [1,000 fr]

The first of these two remarkable memoirs, both of which are in the French language, is devoted to osseous hydatid disease. It is edited by the doctors of Uruguay in homage to its author and is dedicated by the author to Professor Domingo Prat, of Montevideo, Professor Oscar Ivanissevich, of Buenos Aires, and to Daniel J. Cranwell. It is a treatise which can hardly be neglected by anyone interested in its subject. With characteristic modesty, Professor Dévé says that, if he has throughout the work, given his own views, this is not because he wishes to impose them upon others, but because he wishes to call attention to problems as yet unsolved and to provoke discussion and criticism. Certainly no reader could accuse him of seeking to impose his own views unfairly, for, throughout the work, he quotes the work and views of others, giving abundant references to the literature, and his pages are full of reasons why he does not agree with some other writers. He believes, for instance, and gives his reasons for believing, that osseous hydatids are not different from alveolar hydatids, but take the forms, which he so well describes, because the parasite, when it enters the rigid "Procrustean bed" of bony tissue, suffers a structural alteration and a biological change, which determine its peculiar forms and can be compared, as LEUCKART compared it, to the racemose form sometimes assumed by *Cysticercus cellulosae*. Intermediary forms between osseous and alveolar hydatids do exist, in spite of the denial of their existence by POSSELT. Dévé concludes also that Virchow's original conception that multilocular hydatid of the liver is only a particular form of hydatid cyst can be maintained, but only in the sense that these two modes of structure and development are forms assumed by the same parasite. There is, that is to say, only one species of *Echinococcus*. Its alveolar form is a secondary derivation which becomes specific and definitive and its osseous forms are determined by the rigidity of the bony tissues around it. His reasons for this view are expressed throughout this memoir and can only be appreciated by careful study of the whole book.

It is, indeed, impossible to do justice to this memoir in a brief review. Its range and detail are too considerable for that. In the introduction the author points out that osseous hydatid disease constitutes only 1 per cent of all cases of hydatid disease, so that it is rare. It is, however, clinically interesting because it is symptomatically silent for a long time so that the lesions caused by it extend considerably before they can be discovered, and it is pathologically interesting because of the indefinite progression of the lesions in the bone affected and their frequent propagation to neighbouring bones. It also often develops in positions which prevent its surgical removal.

Pointing out that the initial phase of the osseous hydatid has never been seen in man and cannot be studied in him because it never declares itself until it is in an advanced phase or complications have developed, Dévé describes in detail his experimental introduction of hydatid sand into rabbits and other animals and the osseous disease that resulted, comparing his results with those obtained by others. He concludes that bone is a relatively favourable medium for the development of hydatids and that bone has little power to resist their development, a view also held by GANGOLPHE. Bone tissue, says Dévé,

seems to confer on bvd taks a particular vitality a relatively mal nant character. The pathogenic process includes (a) A mechanical process namely a series of disorders caused by the simple expansion in the bone of the hyalid cyst full of fluid under tension and the erosion of bone by pressure upon it and its atrophy. The cyst moulds itself to the bone irregularities, ramifying and taking an irregular form partly owing to the formation of irregular diverticula from the original cyst formed because the resistant bone prevents the normal expansion of a spheroidal cyst. These diverticula may be bifurcated or angular and coalescence of the internal germinal layer lining them may cut off some diverticula from the original vesicle so that independent cysts are formed. In addition to this there is exogenous proliferation which also gives rise to new vesicles. These reproduce and propagate the pathogenic process so that multilocular cysts arise. A series of independent vesicles thus arises in the bone cavities which continue the process by more exogenous budding, so that a sort of colony of the cysts is formed.

(6) **Necrosis of bone** Relatively unimportant forms of this are superficial toxic necrosis and the formation of small sequestra. The most important form of it in man is the massive necrosis due to ischaemia which is seen in advanced stages of erosion.

(c) **Abscess formation**—which is the chief process which destroys both pulp and compact bone. It is not accompanied by inflammation and no fibrous tissue is formed round the isolated prosthesis, provided that infection does not occur.

While the author's views on the development of the parasite and on the manner in which it produces its effects are particularly interesting and valuable, the rest of the book will be for some readers even more interesting. There is not space to consider here all that the author has to say on the aetiology, symptoms, diagnosis, complications, prognosis and treatment of this disease. For the author's summary and discussion of these aspects of ovarian hydatid disease the memoir itself must be consulted. It is likely that it will be consulted by many readers in the years to come for here we have the words of a man whose lifetime of experience and everyone who has ever met such hydatid disease in any form will be grateful for it.

The second memoir listed above is a worthy companion of the first. Some what longer, it amounts to a detailed discussion of the biology and life of hydatid cysts, the treatment of them and the aetiology of hydatid disease. Its geographical distribution and its prophylaxis. Some medical men will no doubt find this volume more useful than the one just reviewed.

The memoir is divided into two parts. Part I, I, with the tracter biology and medical a pect of *Fek* covers Part II with it greater pt al l t that an and with the aetiology and prophylaxis of hydatid disease. A useful list of the first part is a list of the popular names given to it by local live w countries. Then follow description of the adult specimens and the first in the dog a list of its other host and of the host of the hydatid stage and a valuable detailed description of the hydatid cyst itself and of its development and certain anomalous forms of it. The author could have gone on at length to discuss here that there is only one species of *Fek* and to discuss the pathological anatomy and pathogenesis and etiological and pathological relations of hydatid disease with the various organs of the liver to tubercles, tuberculosis and cancer and to make a list of the symptoms and evolution of the disease and to apply it to the various cases considered and then the diagnosis, prognosis and treatment.

The section on art, which opens Part II of the memoir, is one of the parts played by dogs and cats, the cat being operated from 11 drawings. The part played by age, sex, family relation and the manner in which the dog was shot, the considerable sections on the geographical distribution of both the dog and

and on its prophylaxis will be the most useful in the book for these are not dealt with in textbooks in the detail given here. No less valuable are the references to the literature. Certainly every parasitologist will find this memoir invaluable. If he has also the memoir briefly reviewed above and the same author's "*l'Echinococcose secondaire*" (Paris: Masson et Cie et Paul Deval, 1946, 241 pp., 59 figures), he will have, recorded by a master, a detailed discussion of every aspect of this remarkable parasite and its effects. G Lapage

KLEINE, Friedrich Karl. *Ein deutscher Tropenarzt* [A German Tropical Doctor]. Einführung von Herbert KUNERT. 182 pp., 19 figs. 1949. Hanover: Schmorl & von Seefeld Nachf. [D M 12]

All who have had the honour and pleasure of working with Professor Kleine or of being otherwise associated with him in tropical Africa will welcome the appearance of this book, and it will also have a special interest for those whose duties bring them into contact with human and animal trypanosomiasis. It has been published as a tribute to this distinguished research worker in tropical medicine on the occasion of his reaching his 80th birthday.

Kleine's studies of tropical diseases of man and animals during nearly fifty years began when he accompanied Robert Koch in 1903 to Rhodesia to investigate what proved to be African Coast Fever in cattle. A few years later he again accompanied Koch as a member of the German Sleeping Sickness Expedition to German East Africa, and he afterwards devoted most of his life to the study of this disease. In 1909 he proved by simple experiments that trypanosomes develop in tsetse flies for a few weeks before the flies become infective [as Koch suspected in 1905 from his observations on the "proboscis drop"], transmission by tsetse flies was therefore chiefly indirect and not merely mechanical as other workers had thought. Kleine's work on sleeping sickness was interrupted by the first World War in 1914, but in 1922 he went to Rhodesia and the Belgian Congo to test the new drug "Bayer 205" (Germanin) in human and animal trypanosomiasis, in 1926-7, as a member of the League of Nations Sleeping Sickness Commission, he carried out researches in Uganda, Kenya and Tanganyika Territory. He has since spent much of his time in East and South Africa.

The book consists mainly of reprints of interesting accounts which Kleine wrote from time to time of his various visits to Africa, this is preceded by a short preface and a biographical introduction by Professor Herbert Kunert. At the end of the book are a chronological index of Kleine's published papers and an index of names of people mentioned in the book. There are 19 photographic illustrations on 12 plates, they include portraits of Kleine, Koch and David Bruce, some East African scenes, and two poor photographs of *Glossina morsitans* and *G. palpalis* whose labels seem to have got transposed.

As in the case of Robert Koch, a biography of Kleine is largely a record of his research work, but personal qualities such as his perseverance in difficulties, his sense of humour and his unvarying courtesy, so well known to his friends and co-workers, are revealed in these accounts of his travels. The reviewer remembers his reply to doubts expressed whether a lorry could get through the swamps and floods to Ikoma, a 90-mile journey, it was "It is astonishing what a motorcar can do." During the last thirty years Kleine has been accompanied on his travels by his wife, whose cheerful endurance of primitive "bush" conditions, including rat-infested houses, was much admired, and whose many kindnesses to people who, like the reviewer, shared some of those conditions, are gratefully remembered.

J F Corson

KIRK, J. Balfour (C.M.G. M.B. Ch.B., F.R.C.I. D.I.H. D.T.M. & H. etc.)
A Manual of Practical Tropical Sanitation. 2nd Edition. pp. vii + 286
 46 figs. 1949 London: Baillière Tindall & Cox, 7 & 8 Henrietta Street
 W.C.2. 10s. 6d.

The first edition (see this *Bulletin* 1937 & 74 1937) of this manual was a most useful book, designed for sanitary inspectors and for managers of plantations and mines who should know the fundamental facts of the causes, transmission and prevention of disease in the tropics. There are not many books of this kind. This second edition can be recommended very confidently. It is largely a reprint of the first edition with additions to bring it up to date, but as the general principles of the subject have not changed much since 1937 the older material retains its value. The author's style is clear and interesting, and the format is attractive though the print is slightly smaller than in the original edition. However it is still quite big enough to be read with comfort. The illustrations are the same as before (including the intriguing picture on p. 253 of the aqua privy where the user must sit astride, perch himself (or herself) on the end of a 6-inch drain-pipe and hope for the best).

Many additions have been made but they have been kept so brief that the book has not been greatly lengthened and there are some deletions. For instance DDT and benzene hexachloride are described, and their uses are detailed—a section has been added on poliomyelitis (but there is no reference to this in the index). ANTU is included (p. 135) among the rat poisons (but the proof reader has allowed *Rattus Norvegicus* to elude him). Some of the new anti-malarial drugs (but not chloroquine) are mentioned, though the measures suggested for suppression are smaller than those now accepted.

On the other hand, there are some important omissions. The spread of *Entamoeba histolytica* by water is not mentioned. There is no reference to jungle yellow fever, the process of transmission in malaria is not described, though immunity in other diseases is discussed. Scrub typhus and murine typhus are not described. These however are small defects in a book which will be of the greatest value to sanitary inspectors. It contains chapters on elementary anatomy and physiology, the communicable diseases, entomology, disinfection, housing, food, milk, water, sewage, refuse, London's schools and village sanitation. The author writes with the authority of his long tropical service as a health officer and as a Director of Medical Services.

J. H. W. JACK

TROPICAL DISEASES

BULLETIN

Vol. 46]

1949

[No 12

MALARIA

SAUTET, J. Etat actuel du paludisme et de l'anophélisme dans la région méditerranéenne [Present State of Malaria and Anophelism in the Mediterranean Region of France] *Rec Travaux Inst Nat Hyg Paris* 1944, Tome 1, v 2, 176-96, 4 figs

This is a record of the results of investigations carried out in the Mediterranean regions of France during 1943. At that time there were in that area a large number of immigrants from non-malarious areas, who were under continuous observation.

The history of malaria in southern France prompted special attention to three districts, Perpignan, the southern part of the Gard Department, and the Little Camargue. In the Perpignan region malaria was very prevalent from 1939 to 1942, as the result of the arrival of numerous infected refugees from Spain. Canet was the centre of this outbreak which extended westward to Perpignan, southward to Argeles and northward to the Salces Swamps. In 1942 there were 126 cases in Canet alone. By 1943 the outbreak was all but over, only a few cases were found in Canet village. The suppression of the outbreak could not be ascribed to measures of control which were limited to the treatment of the sick.

In the south of the Gard Department, 28 cases of *P. vivax* malaria were reported in 1942 among 3,000 young people who had come to help in the grape harvest. Most of these patients had presumably acquired their infections before arrival. There was no evidence of malaria in this area in 1943.

The most malarious region in 1943 was the Little Camargue. Forty-two primary indigenous cases of malaria were observed in or around Saintes-Maries de la Mer, in September and October. In the latter month, 69 cases of *P. vivax* malaria were also observed among immigrants. *P. vivax* was the only species found. Clinically the disease was mild everywhere.

Elsewhere in southern France there was little or no evidence of locally acquired malaria in 1943.

In the Perpignan area four races of *A. maculipennis* were found, *typicus*, *messeae*, *atoparous* and *cambournaci*. The same races were found in the south of the Gard Department where some specimens of *melanoon* were also found. Adults were plentiful in stables and cattle sheds but rarely if ever found in human dwellings. In Camargue *A. hyrcanus* is reported in addition to the five races of *A. maculipennis* mentioned above. Here zoophilism is somewhat less marked than in other areas, *A. maculipennis* was often found in dwellings though in less numbers than in cattle sheds, etc. Nowhere were anophelines found breeding in salt water.

Anopheline breeding places are restricted to irrigation canals and small collections of water. Larvae were seldom if ever found in large swamps and marshes. Large reclamation works are not called for.

[The impression conveyed by this report is that the probability of malaria becoming a serious menace to the health of southern France is exceedingly remote in spite of the very defective sanitary conditions in which sections of the population are living.]

Norman White

ROBERTS J. I. The Parasite Rate in High Altitude Malaria. *J Trop Med & Hyg* 1949 Aug 52, No. 8 160-69

This paper is largely an analysis of the results of the examination of thick drops of blood taken from hospital patients in Nairobi, Kenya, during the years 1933 to 1944. The blood was stained by Field's method, and *Plasmodium falciparum* was the only species considered. The figures indicate that an epidemic took place in 1940 when the incidence of positive slides was 23 per cent, as compared with 9 per cent. in the previous two years gradually reverting to 9 per cent. by 1944. All races (European, Asian and African) participated in this epidemic though the increase was most marked amongst the Asians. Malaria rates ordinarily become higher throughout the months of January, February, and March, i.e. at a time prior to heavy rainfall and a greater density of the vector, then for about 10 to 14 days before the onset of the rain there is said to be a very decided increase in these rates. It is suggested that this phenomenon is due to some change in the virulence and tenacity of the parasite itself. *Anopheles gambiae* was the vector and although the population had a high crevcent rate the sporozoite rate was unaccountably very low.

The author states that at the high altitude (5,400-5,700 feet) malaria assumes a lowly and mild form often unaccompanied by fever with scanty parasites in the blood and little anaemia. Frequently these nearly symptomless cases, if untreated progress to an intractable state of chronic debility.

[The title of this paper is misleading. Its contents do not deal with the parasite rate but with the incidence of *P. falciparum* in blood slides taken from hospital patients while the high altitude malaria affects only a single town at an altitude much lower than that of many epidemic localities.]

P. C. C. Garabam

LACIDAJER J. Species and Races of Malaria Mosquitoes occurring on the Coast of the Gulf of Gdansk. *Bull. Inst. Mar. & Trop. Med. et Mal. Gdansk, Poland* 1949 v. 7, No. 1-2 91-4 1 map.

The biology and distribution of anophelines on the southern and western coast of the Gulf of Gdansk (Danzig) were studied in 1947-48.

The delta of the Vistula, the western coast of the Gulf of Danzig and the Hel Peninsula together constitute low-lying terrain much of which contains collections of water such as bogs, landlocked bays, streams and ditches. These and artificial water holes are fed by war operations provide conditions very favourable to the development of mosquito larva.

The mosquito races were determined from eggs collected in these places or laid in the laboratory. The adult female mosquitoes were caught in their daytime resting places or in their winter quarters, e.g. stables, cellars and human dwellings.

The anophelines found were *Anopheles claviger* and the three races of *A. maculipennis*. The re surveyed is shown a map divided into four sections. *A. maculipennis maculipennis* was the least commonly found on the coast and

Malaria

Vol 46, No 12]

was not detected at all on the Hela Peninsula. *A m messeae* flourished in the fresh-water regions, while *A m atroparvus* was most prominent where the water was mixed with salt from contact with the sea, e.g. mouths of rivers and land-locked bays. The percentage findings of each type in the four sectors are shown in a table which shows the great preponderance of *messeae*, except in the Hela Peninsula. Another table indicates the mean numbers of eggs laid at one time by female *messeae*, *atroparvus* and *maculipennis*, which were 162.4, 140.8, 133.5 respectively.

The author points out that between races of *A maculipennis*, especially *messeae*, in different countries there is some difference in the structure of the egg, owing to variation in the number of float ridges. The figures given are for Sweden (14 to 21), Holland (18 to 32) and the Polish Coast (18 to 28).

It is evident that anophelines are present in the whole coastal belt of the Gulf of Danzig. On the respective capacities of the different races to act as local vectors of malaria will depend whether the disease will acquire endemic characteristics, and this has yet to be determined. *A m atroparvus* is a vigorous feeder and viable even in winter and is very frequent on the Coast. *A m messeae*, though less liable to be infected, may be of epidemiological importance because of the large numbers present, while *A m maculipennis* is markedly zoophilous and occurs in comparatively small numbers in the area described.

H J O'D Burke-Gaffney

TERREIRA T S da C, PINTO, A R & DE ALMEIDA, C L. Alguns dados sobre a biologia do *Anopheles gambiae* da cidade de Bissau e arredores (Guiné Portuguesa), em relação com a transmissão da malária e filariase linfática [Facts on the Biology of *Anopheles gambiae* in the City of Bissau and its Neighbourhood, Portuguese Guinea, and its relation to the Transmission of Malaria and Filariasis]. *An Inst Med Trop* Lisbon 1948, Dec., v 5 223-50. 5 text figs (1 map) & 16 figs on 8 pls [14 refs] English summary.

The paper reports a large amount of work carried out in Bissau and its neighbourhood in Portuguese Guinea. The situation is evidently the same as what is familiar in West Africa.

Among the domestic mosquitoes *A gambiae* is much the most numerous species. The average anopheline rate per house being about 11 with a maximum of 14 to 25 per cent in the dry and wet seasons respectively. Larval nematodes which the authors identify as *Il bancrofti* were found in the proboscis in 0.51 per cent of the dissections. [The identification may be correct, but it would be well to accumulate convincing evidence on that point.] Precipitin tests carried out on *A gambiae* were positive with anti-human serum in 55 per cent. The children's spleen rate was 57 per cent and parasite index 58 per cent. Most of the malaria parasites were *P falciparum*.

P A Buxton

HORSFALL W R & PORTER, D A. Biologies of Two Malaria Mosquitoes in New Guinea. *Ann Entom Soc Amer* 1947, v 39 No 4 549-60. 4 figs 11 refs. [Summary taken from *Rev Applied Entom* Ser B 1949 July, v 37 Pt 7 128-9].

Anopheles punctulatus Dön., and 4 *farauti* Lax. are the principal vectors of malaria in New Guinea and adjacent islands and possible vectors of filariasis (caused by *Filaria (Wuchereria) bancrofti*) in parts of these areas. An account is given of observations on their bionomics made during 1943 and

1944 in eastern and northern Papua and on Bial in the Schouten Group. *A. punctulatus* was most abundant on heavy clay soil, whether at sea level or inland, and was reported to occur as high as 3,500 ft. in the mountains. *A. farauti* was present on the coastal plains where the soil was sand or mud, and both species occurred where the soils intergraded. Larvae of both developed largely in sunlit ground pools, *A. punctulatus* mainly in depressions such as tracks of all sorts, especially in clearings incident to construction of army camps and *A. farauti* in natural pools, particularly those with floating sticks or vegetation and grassy margins of sluggish streams. *A. farauti* also bred in partly shaded sections of mangrove swamps subject to only slight tidal fluctuation particularly if floatage was abundant.

A. punctulatus required on the average one day less than *A. farauti* for the egg stage and each larval instar. The mean durations in days of the egg, larval and pupal stages in the laboratory were 2.5, 7.5 and 1 for *A. punctulatus* and 3.5, 11.3 and 1.2 for *A. farauti*. In the field, under very favourable conditions in sunlit sites, the former may complete larval and pupal periods in five or six days. Applications of larvicides must therefore be repeated every five days to ensure its control but once a week was adequate where only *A. farauti* was present.

Eggs of both species may be deposited on moist surfaces or on water. Those on moist surfaces incubated at the normal rate but did not hatch until flooded; they remain viable for 14 days. Larvae of *A. punctulatus* were very active but those of *A. farauti* moved little except when disturbed. Adults of both species were collected on moist banks near villages. *A. punctulatus* was most commonly taken on vertical banks out of direct sunlight within a few feet of a frequently used trail or place where natives sat on the ground to work. The limit of effective flight-range of *A. punctulatus* was determined, by elimination of larvae by oiling in a native area near Oro Bay to be $\frac{1}{2}$ mile. Females at a collecting site at this distance from the untreated area were reduced by about 97 per cent. The population returned to normal within six weeks.

Dissection of 414 females of *A. punctulatus* that had probably fed only once in the wild in an area where malaria was prevalent showed oöcyts in 50 and sporozoites in three. Of 132 females of *A. farauti* examined, five contained oöcyts and none sporozoites. Unidentified filarial larvae presumed to be *Filaria (H. uckeri)* sp. were found in 3.8 per cent. of *A. punctulatus* and 3 per cent. of *A. farauti*.

LEVI CASTELLO Roberto. Atlas de los anelasma Sudamericanos.

This book is reviewed on p. 1193.

LOCKERT G. Quadried atteggiamenti midollari della malaria cronica. [Reaction of Bone-Marrow to Chronic Malaria Infection.] *Riv. di Malaria* 1948, Dec., v. 27 No. 6, 231-53. [29 refs. English summary (9 lines)]

For a long time the author has been engaged in a study by means of sternal puncture of changes in the bone-marrow that occur during chronic malaria infections. In this paper he gives the result of differential cell counts of the marrow in seven patients suffering from chronic malaria. The reaction of the marrow to the infection is essentially parenchymal and haematogenous (sic). The changes are varied and inconstant. There is rarely any marked change in the reticulo-endothelium. The author believes that the destruction of red cells is not solely responsible for the changes in marrow structure observed; asthenic, inhibitory and toxic factors are also involved. Vernia White

REIN, C R, BUKANTZ, S C, KENT, J F, COOPER, W C, RUHE, D S & COATNEY, G R Studies in Human Malaria. XIX The Course of the Complement-Fixation Reaction in Sporozoite-induced St Elizabeth Strain Vivax Malaria *Amer J Hyg* 1949, May, v 49, No 3, 374-84, 2 figs [15 refs]

The course of the complement-fixation test was studied for 18 months in 87 prisoner volunteers infected with sporozoites of *P vivax*, St Elizabeth strain. The antigen used was an alkaline phosphate buffer extract of *Plasmodium knowlesi*. A total of 6,604 samples of serum were examined during the course of the study. Positive serological reactions were associated with all but 4 of 199 malaria attacks affecting the 87 subjects.

Positive complement-fixation reactions appeared in primary attacks 7.2 days after patent parasitaemia and 6.2 days after the onset of fever (averages). In relapses these intervals were 4.4 and 2.3 days. The test remained positive for 42 days during primary attacks and for 125 days during repeated relapses.

The complement-fixation test might be useful in identifying recently subsided attacks of *P vivax* malaria but would be of no value in diagnosis early in an attack or in the long latent period between early and late activity. During recurrent attacks the test could detect more infected persons than could the examination of blood smears.

Norman White

FIELD, J W Blood Examination and Prognosis in Acute Falciparum Malaria *Trans Roy Soc Trop Med & Hyg* 1949, July, v 43, No 1, 33-48, 12 figs [14 refs]

Divergent opinions as to the frequency or rarity of severe cases of untreated falciparum malaria with "negative blood slides" and as to the value of blood parasite counts in the prognosis of falciparum malaria prompted the observations recorded in this paper. Records of 2,136 cases of acute uncomplicated falciparum malaria that were treated in the Government Hospital adjoining the Institute for Medical Research, Malaya, during a number of years, were studied. Fifty of the patients died. Parasites in blood films were counted daily during treatment. Thirty-nine of the deaths were in patients whose peripheral blood before treatment showed at least 100,000 parasites per cmm. Only three fatal cases had peripheral blood parasite counts of less than 10,000 per cmm. It seems clear that in Malaya parasite counts in adult Asiatic patients suffering from untreated falciparum malaria are of great prognostic significance, high counts indicated a high risk, low counts a low one.

When parasitaemia is reduced by treatment, prognosis from blood films becomes less reliable. Death may occur when the number of parasites has fallen below the level at which they may be found by thick-film examination. Most of the fatal cases in this series, however, still showed high parasitaemia on the day of death.

Schizonts are more likely to be associated with high levels of parasitaemia, their presence at lower levels of parasitaemia did not necessarily indicate clinical gravity.

The author is sceptical of the view that serious, even fatal, falciparum malaria may occur without parasites ever reaching the peripheral blood. Valid evidence of such occurrence must meet the demands that other possible causes of the symptoms are excluded, the parasites have not receded from the blood as the result of earlier treatment, the staining is reliable, parasites are found at autopsy in vital organs.

Six patients in the series survived infections with parasitaemia of 500,000 per cmm or more.

The author advocates the adoption of routine parasite count in all serious cases of *falciparum* malaria. Made before treatment is commenced they give information which cannot be obtained in any other way. The technique is simple—a count of parasites per 1 000 red cells in a Romanowsky-stained thin film and a total red cell count.

Norma Blake

MORALLS A. B. ORTIZ, A. L. & GARCIA, L. S. Malaria simulating Acute Appendicitis. *J. Philippine Med. Ass.* 1949 Mar., v 25 No 3 135-40.

After removing normal appendices from two patients with symptoms of acute appendicitis who later responded to antimalarial therapy, the authors adopted a more critical attitude towards patients with a diagnosis of appendicitis in malarious countries. They report six cases in which a diagnosis of acute appendicitis was either considered or made but in which further investigation revealed a malaria infection as the cause of the symptoms.

In all six patients the localizing symptoms—pain and tenderness in the right iliac region—occurred after several days of malarial fever and sometimes vomiting. This fact and the finding of a normal or low leucocyt count led the authors to suspect malaria which was confirmed by the finding of malaria parasites in the peripheral blood in each case. The infecting parasite was *Plasmodium falciparum* in five cases and *P. vivax* in one.

The authors consider that the cause of the symptoms is the blocking of the capillaries of the mucosa and villi and they discuss the course of the nerve impulses set up locally in the appendix and caecum by this protozoal infection.

L. E. Napier

COLTZEN A. Malaria congenita. Congenital Malaria. *Rev. d. Mal. d. Ind.* 1949 Dec. v 27 No 6, 235-9. English summary (6 lines).

During a period of nine years the author has observed 14 women who had clinical attacks of malaria before and after parturition. Eleven had *P. vivax* infection, three *P. falciparum*. None of the three infants born of mothers with *P. falciparum* infection showed any signs of malaria. Five of the 11 infants born of mothers with *P. vivax* malaria developed the disease very soon after birth—two within 40 hours, one on the fourth day, one on the fifth day and one on the seventh day. The infections in all 11 infants were very readily cured with very small doses of quinine. None suffered from relapse during a period of observation of more than a year. The cures were possibly spontaneous by reason of immunity acquired during gestation.

Norma Blake

CHEMFIPTOS S. Malaria tertiana in die Psychiatrische Klinik. (1929-1948). Tertian Malaria among Psychiatric In-Patients at Frankfurt 1929-48. *Nachricht. Psychiat. Grenzsch.* 1949 July 7 v 43 No 27 200-30. 1 graph. 13 ref. English summary (8 lines).

Since the beginning of the century tertian malaria has been prevalent among the psychiatric patients of Frankfurt in the northern part of the North Rhine. Between 1929 and 1948 1 326 patients were affected. There were 434 relapses in 334 patients. Numbers affected remained fairly constant up to 1941 when there was a sharp rise lasting up to 1946 in which year 34.7 per cent of the patients were affected. In 1947 the rate fell to 27 and in 1948 to 31 per cent. It was noted that an autumn peak always preceded a higher rate the following spring.

Clinically, cases were recorded in which onset of exacerbation of psychiatric symptoms coincided with an attack of malaria, often undiagnosed. In some cases, however, an attack of malaria was associated with an improvement in the psychiatric condition.

Various forms of treatment were employed. Quinine sulphate, 1 gm daily for seven or 14 days, resulted in 49.2 per cent of relapses. With atebrin [mepacrine], three tablets daily for seven days, there were 39.3 per cent of relapses and two cases showed psychotic symptoms. The majority of patients received "chinoplasmine", three tablets daily for 7, 14 or 21 days, giving relapse rates respectively of 52, 9.7 and 1.7 per cent. There were a number of complications, including various cardiac side-effects, few of them serious and mostly associated with pre-existing cardiac damage.

The most satisfactory therapeutic agent was "Kinplex", a Dutch preparation containing 150 mgm quinine sulphate and 9 mgm pamaquin per tablet. With a dose of six tablets a day for 14 days there were no relapses at all in 51 patients treated and no complications or side-effects.

A. L. Winner

BROUNST, G. Présence de *Plasmodium ovale* à Beyrouth (Liban) [*Presence of Plasmodium ovale in Beirut (Lebanon)*] *Bull Soc Path Exot* 1949, v 42, Nos 5/6, 257-9

A case of *Plasmodium ovale* malaria is described from Beirut, Lebanon. A female child was brought for examination and was found to be ill-nourished and anaemic, and to have enlargement of the liver and spleen. Numerous schizonts of *Plasmodium ovale* were present in the blood. Treatment with quinine for three days followed by mepacrine for five days cured the child whose general condition was much improved. The parasites were diagnosed by examination of drops of blood stained with Giemsa's stain; they were in the stage of large schizonts, surrounded by Schuffner's dots, visible in spite of the loss of haemoglobin in the thick drop, and were said to be very typical of this species.

[The diagnosis of *Plasmodium ovale* in a thick drop from a locality where the infection has not been reported before is open to some criticism, even well-stained thin films are not always easy to diagnose. The parasites were stated to be oval in this infection—it is usually thought that a crucial diagnostic feature of *Plasmodium ovale* is the round parasite in an oval erythrocyte. The author states himself that *ovale* malaria is extremely benign, and yet this case presented symptoms of some severity which were ameliorated by antimalarial treatment.]

P. C. C. Garnham

COOPER, W. C. Summary of Antimalarial Drugs. *Pub Health Rep Wash* 1949, June 10, v 64 No 23 717-32 [101 refs.]

This short article on antimalarial drugs contains no new information but has been written in an attempt to clarify the confusion, which the author rightly believes to exist in the medical literature, with respect to those substances synthesized in the last few years. At different times they have been referred to by a number, synonym or under a proprietary name. All the compounds dealt with namely, quinine, totaquine, quinacrine [mepacrine], chloroquine, oxychloroquine, sontochin, camoquin, paludrine [proguanil], pamaquin, pentaquine and isopentaquine have received mention in this *Bulletin* with, as a rule, some synonyms in brackets. In the case of quinacrine no fewer than twelve additional names are mentioned in the present article. Constitutional formulae, dosage both therapeutic and suppressive, synonyms, behaviour in

the body activity and indications for use are briefly described. For the treatment of acute attacks of malaria the author states that quinine, quinaquine, chloroquine or other 4-aminoquinolines or paludrine are adequate. He believes that for this purpose chloroquine is the drug of choice and like paludrine is a good suppressant. For relapsing benign tertian infections the value of quinine in combination with one of the above 8-aminoquinolines is recognized.

J. D. Fallon

FIELD, J. W. Modern Anti-Malaria Drugs. *Med. J. Malaya* 1949 Mar v 3 No 3 173-90 8 figs. [33 refs.]

This summary of the characteristics of some of the synthetic anti-malaria drugs that have proved their worth should be of great value to practitioners and malaria workers who have not ready access to the vast literature dealing with the subject. The drugs dealt with are atebryn [mepacrine], paludrine [proguanil], chloroquine, santonchin, plasmoquine, pentaquine, camoquin and metachlorondine. The chemical structure of each of these remedies is graphically described as is their mode of action, therapeutic and suppressive dosage, elimination and toxicity. The full list of synonyms of each of these drugs is particularly useful. The relative costs of treating an acute attack of *falciparum* malaria with quinine, atebryn, paludrine and chloroquine for seven days, respectively, are illustrated in graphic form, as are the costs of suppression with these drugs, per person per year. The comparison is based on present wholesale prices in Malaya.

An addendum summarizes some recent reports on paludrine-resistant strains of *P. falciparum*. Such strains have not yet been reported in Malaya. For the treatment of attacks of *P. falciparum* malaria, 300 mgm. of paludrine daily for 7-10 days are recommended, reinforced on the first day only with 600 mgm. of atebryn in two doses of 300 mgm. or with 2 gm. of quinine in 4 divided doses.

Norman White

BLACK, R. H. Observations on the Treatment of *Falciparum* Malaria. *Trans Roy Soc Trop Med & Hyg* 1949 May v 42, No. 6 593-8 6 figs. on pl. and 1 chart. [13 refs.]

The object of this short paper was "to outline a rational view of the present treatment of *falciparum* infections in the light of our present knowledge of the mode of action of antimalarial drugs."

Intravenous injection of paludrine, proguanil has been used for the treatment of cerebral malaria. Paludrine acts upon trophozoites only at the stage of earliest chromatin division. In cerebral malaria parasites harbored within the cerebral capillaries are in the later stages of development; much time will be lost if paludrine is the only drug used in the treatment of such a case.

Quinine and atebryn (mepacrine) arrest the development of *P. falciparum* early in the asexual cycle. Quinine should be used in the treatment of cerebral malaria as well as in heavy infections with *P. falciparum*. The strains of the species of parasites of both human and bird malaria differ among themselves in their response to antimalarial drugs.

The best treatment for a good therapeutic response in severe *falciparum* infections is the intravenous injection of 10 gram. of quinine dihydrochloride in solution, given over a period of 10 minutes. This should be followed by oral paludrine. In debilitated patients with thrombocythemia the intravenous injection may have to be given more slowly, by drip infusion, for example.

Norman White

FAIRLEY, N H The Efficacy of Paludrine (Proguanil) as a Therapeutic Agent (West African and New Guinea Strains of *Plasmodium falciparum*) [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1949, May, v 42, No 6, 623-6

COVELL, NICOL, SHUTE and MARYON recently reported failure to cure patients infected with a West African strain of *P falciparum* with a single course of paludrine [proguanil] [this *Bulletin*, 1949, v 46, 703] They suggested that the high rate of radical cure obtained with paludrine by FAIRLEY *et al* at Cairns may have been due to delayed treatment In the Cairns experiments, however, paludrine treatment was instituted at various intervals after exposure to infection, from the time sporozoites first entered the blood on the seventh day till several weeks after the onset of overt malaria The author thinks that delayed treatment, with development of partial immunity, was not responsible for the radical cure obtained The extreme sensitivity of the New Guinea strains of *P falciparum* to the schizonticidal action of paludrine was shown by the facts that a single dose of 100 mgm paludrine often resulted in clinical cure and the temporary disappearance of asexual parasites in non-immune volunteers, a high incidence of radical cure was obtained in both natural and experimental infections by the administration of 0.1 gm paludrine thrice daily for 10 days, asexual erythrocytic parasites disappeared from the blood during such a course of treatment in 2.1 to 2.35 days

The discordant results must be attributed to differences between two distinct geographical strains of *P falciparum* New Guinea is situated well within Wallace's line, so perhaps it is not surprising that its strains of plasmodia have special characteristics
Norman White

RUHE, D S, COOPER, W C, COATNEY, G R & JOSEPHSON, E S Studies in Human Malaria XII The Protective and Therapeutic Action of SN 5241 against St Elizabeth Strain Vivax Malaria *Amer J Hyg* 1949, May, v 49, No 3, 346-54, 6 figs

SN 5241 is α -(dinonylamino-methyl)-1,2,3,4-tetrahydro-9-phenanthrene-methanol It is a close analogue of NIH-204 (SN 1796) which was found to have insufficient antimalarial activity [this *Bulletin*, 1948, v 45, 147, 150]

Twenty-one prisoner volunteers were the subjects of this inquiry, they were infected by the bites of *Anopheles quadrimaculatus* with the St Elizabeth strain of *P vivax* SN 5241 hydrochloride was given in capsules each containing 0.25 gm of base The usual dose was 1.5 gm a day The drug was shown to have antimalarial activity, but its action is slow It does not permanently prevent or cure vivax malaria During 18 courses of therapy two patients developed severe maculo-papular skin reactions and a third had mild urticaria. Two of 10 subjects undergoing protective tests also developed skin reactions It did not produce the undesirable side-effects that SN 1796 does but the high incidence of cutaneous reactions precludes its routine use
Norman White

COOPER W C, RUHE, D S, COATNEY, G R & JOSEPHSON, E S Studies in Human Malaria XIII The Therapeutic Action of Metachloridine (SN 11,437) against St Elizabeth Strain Vivax Malaria *Amer J Hyg* 1949, May, v 49, No 3, 355-60, 2 figs [15 refs]

This records the attempted cure of 10 prisoner volunteers who had been infected with the St Elizabeth strain of *P vivax* by mosquito bite They were all treated during late attacks, occurring more than six months after infection

Their early attacks had been suppressed by either quinaquine (mequacine), santonchin or chloroquine. Blood smears were examined at least once weekly until 18 months after original exposure to infected mosquitoes.

SN 11 437 (metachloridine) a sulphonamide was administered in capsules each containing either 0.25 or 0.5 gm. of the drug. Five patients were treated with SN 11 437 alone. For delayed primary attacks the dosage was 0.5 gm. every six hours for 12 days. In the treatment of second or third attacks the dosage was raised to 4.0 gm. a day sodium bicarbonate was given concurrently with the larger doses and doses were at times reduced so as to maintain plasma concentrations at about 14 mgm. per 100 ml. There was slow clearance of patent parasitaemia, average 6.2 days; subsidence of fever averaged 3 days. Relapses occurred after 3 of 5 initial late attacks and after one of 3 second late attacks; parasites reappeared in the blood 22 to 58 days after the end of treatment. One patient on the third day of the second course developed a petechial rash of the lower limbs.

In a second series of five cases the SN 11 437 in doses as above was reinforced with 2.0 gm. of quinine sulphate a day. The response was what might have been expected from quinine alone. Relapses occurred after all five of the initial courses of treatment at intervals of from 31 to 46 days. No further activity followed second courses. One of these patients also developed a purpuric rash on both legs during the second course.

It may be concluded that SN 11 437 has serious deficiencies which make it unlikely that it will become a generally useful antimalarial.

Norman H. Ayle

RENE D. S. COOPER, W. C. COATNEY G. R. & JOHNSON E. S. Studies in Human Malaria. XIV. The Ineffectiveness of Colchicine (SN 12,000) SN 7266 and SN 8557 as Curative Agents against St. Elizabeth Strain Virus Malaria. *Amer J Hyg* 1949 May v 49 No 3 361-63 figs. [13 refs.]

Colchicine (SN 12,000) SN 7266 (the ethyl ester of β -guanylfenazone acid) and SN 8557 (3-(decahydro-2-naphthyl)propyl 3-hydroxy 1,4-naphthoquinone) all failed to prevent relapses when administered after quinine sulphate treatment of attacks of St. Elizabeth strain *P. m. malaria*.

Norman H. Ayle

RENE D. S. COOPER, W. C. COATNEY G. R. & JOHNSON E. S. Studies in Human Malaria. XV. The Therapeutic Action of Pamaquine (Plasmochin) against St. Elizabeth Strain Virus Malaria. *Amer J Hyg* 1949 May v 49 No 3 367-73, 1 fig. [19 refs.]

Twenty-three subjects with late primary attacks of *P. m. malaria* St. Elizabeth strain were treated with pamaquin naphthoate and quinine sulphate. Relapse was observed in one patient out of four who had had 0.03 gm. (dose) of pamaquin a day for six days after a six-days course of quinine sulphate 2.0 gm. a day. No relapse occurred among 19 patients who were given 0.03, 0.06 or 0.09 gm. (dose) of pamaquin a day concurrently with 4 gm. of quinine sulphate a day for 1 day. These results contrast with a relapse rate of 80 per cent. when late primary attacks of this strain of *P. m.* are treated with non-curative drugs such as quinine, quinaquine, mequacine, chloroquine, santonchin or metachloridine.

Norman H. Ayle

GARCIA E. J. The Inhibition of Malarial Relapses by Tarsolol of Chloral, m. *Ann. Reprinted from A. New York Acad Sci* 1949 June 7 50 Art. 3, 171-86, 4 figs.

A chance observation of a remarkable case prompted the investigation described in this paper. A mental patient undergoing malaria therapy in the

U S A. developed gas gangrene, a *Clostridium welchii* infection. The *P vivax* parasitemia disappeared spontaneously the day after the onset of gangrene, and malaria parasites did not reappear. When the author returned to the Philippines he decided to ascertain whether the allied tetanus toxoid possessed any antimalarial activity.

Three hundred and nineteen patients suffering from malaria were treated and observed for 330 days. They all received a basic treatment which consisted of an intramuscular injection of 0.10 gm atabrin [mepacrine] followed by the oral administration of either 2.1 gm atabrin or 3.5 gm chloroquine during a period of seven days. Sixty-five of these patients, 40 with *P vivax* and 25 with *P falciparum* infections, received no further treatment. Thirty-six, 90 per cent, of the *P vivax* patients had parasite relapses, as had 21, 82 per cent, of the *P falciparum* patients. The average interval to relapse was 115 days.

The remaining 254 patients (193 *P vivax*, 61 *P falciparum*) each received, at the end of their basic treatment, a subcutaneous injection of 1 cc tetanus toxoid in the deltoid region. This was repeated three weeks later. None of the *P falciparum* and only 15 (7.7 per cent) of the *P vivax* patients so treated had a parasite relapse. The average interval to relapse was 315 days. The author suggests that the toxoid stimulates the phagocytic activity of reticulo-endothelial cells.

Norman White

GARNHAM P C C. Malarial Immunity in Africans. Effects in Infancy and Early Childhood. *Ann Trop Med & Parasit* 1949, Apr, v 43, No 1, 47-61, 2 text figs & 2 figs on pl [33 refs]

Most of the observations recorded relate to a single African tribe, the Luo, living around the Kavirondo gulf of Lake Victoria, East Africa, a highly malarious region.

Congenital malaria was not observed among 146 infants born of mothers infected with malaria, with one possible exception, a case of *P malariae* infection which is described. Malarial infection rarely resulted in still-birth or in the death of the infant during the first week of life. The Luo infants are born free from malaria parasites and are unlikely to suffer ill effects from infection in the mother. From a third to a half of Luo children are likely to acquire *P falciparum* infection during the first six months of life, all are infected during the first year. A quarter of the infants acquire *P malariae* infection during the first six months, and nearly all during the first three years of life. The incidence of *P vivax* infection is patchy. The parasite rate during the first two months of life was only 10 per cent, this low rate is possibly explained by transmitted passive immunity.

Malaria among these children was clinically a mild disease, only 10 per cent of cases were severe. The temperature rarely rose above 100°F, convulsions were rare.

Seventy-five children were examined periodically for two years with special reference to the effect of the malaria infection. It caused little deterioration of general physique. Fever was slight and unaccompanied by convulsions. The normal increase in weight was uninterrupted during the first attack of malaria in a third of the children, in the remainder the weight remained stationary or there was a slight loss. The red-cell count was lowered by 13 per cent during the first attack but after five months of continued malaria infection the count had returned to normal. Six of the children died, only one from malaria. Each child received only 30 to 60 grains of quinine throughout the whole two years.

Post mortem examinations were made of 3 infants whose blood had shown malaria parasites and who would normally have been certified as having died from malaria. Malaria was the cause of death of only 17 of the 52. Meningitis, pneumonia and gastro-enteritis were among the causes of death of the others. Malaria in infants is characterized by an unusually massive lymphoid macrophage response to the infection. In the liver the proliferation and swelling of the Kupffer cells is excessive. The blood vessels are encorged with lymphoid-macrophage cells in all stages of development. Throughout the body the swollen and proliferated endothelium interferes with the blood supply as much as do clumped parasitized erythrocytes.

No evidence of exocerythrocytic schizogony was found in brain, heart, liver or spleen.

Malaria in early childhood must be studied against a background of immunity—phylogenetic transmitted passive and acquired immunity.

Norman H. Aik

GARNHAM I. C. C. *Modern Concepts in Malaria Control*. J. Roy. Soc. Med. 1949 Sept. 1, 69 No. 3 817-23 [30 refs.]

The modern insecticides have transformed the situation in regard to malaria control, but they have not made the older methods obsolete, and it is still wise to drain swamps and trim streams. Nevertheless the insecticides have made possible programmes of control or eradication which would have seemed impossible by the older methods. The author gives an interesting account of his own work on the control of epidemic malaria in the Kenya highlands where *Anopheles gambiae* transmits the disease seasonally. The use of DDT in the houses of an African population of 10,000 in a tract of country covering 60 square miles at 8,000 feet was responsible for a distinct fall in parasite rates and an even more impressive fall in numbers of *A. gambiae* caught in houses. Comparisons were made with neighbouring untreated areas, which unlike the treated country were swept by malaria. A more clear-cut result would probably be obtained if a bigger tract were treated.

The author writes very favourably of dimethyl phthalate as a repellent.

Garnham discusses, in a very brief section, the subject of immunity, when he writes: 'it is difficult to underestimate the importance of immunity in any tropical Africa (one knows what he means)'. In the hyperendemic areas of Africa the adults do not suffer from malarial fever and the children and infants show little evidence of its effect. The death rate from malaria of infants has probably been much exaggerated: the author performed post mortem examinations on 52 infants (of various tribes) all supposed to have died of malaria but he found that this was the true cause of death in only 17, the rest having died of undiagnosed meningitis, pneumonia, etc. (see also GARNHAM above). Garnham then postulates the effect of incomplete control in a hyperendemic area: infection would be reduced to perhaps one or two infective bites per annum instead of hundreds and the result would be gradual loss of immunity and if control were subsequently slackened devastating epidemic of malaria might occur. This kind of event has been postulated before but the reader may ask whether it has, in fact, actually happened. Garnham has himself stated that if the infants and children in a community do not suffer severely from malaria 'it may be because of an in-born immunity, not merely a passive immunity derived from their mothers during the first few months of life'. If this is true it is not easy to foresee how devastating an epidemic would be. Constant infection no doubt creates the state of premunition but it does so in people already considerably endowed with in-born resistance. In time of course the reduction of infection would

permit survival of less immune individuals, and the community as a whole would become more susceptible to the disease, but this process might be very slow]

The author makes the point that in hyperendemic areas it would be advisable to consider whether large sums of money could be more usefully employed on the provision of water, prevention of soil erosion, and other measures, rather than on malaria control. He advocates further research into the alleged grave effects of the disease in hyperendemic areas [The reviewer entirely agrees that this research is needed. He also thinks that an experiment is needed to discover just what will happen if incomplete control is established in a hyperendemic area]

Charles Wilcocks

CIUCA, M., ALEXA, I., DUPORT, M. & ATHANASIU, M. Efficacité et limites de la chimiothérapie dans un programme systématique de lutte antipaludique. Recherches effectuées au cours d'une épidémie fulminante à *P. falciparum* [Efficacy and Limitations of Chemotherapy in a Systematic Anti-Malaria Campaign. Research undertaken during a Violent *P. falciparum* Epidemic.] *Arch Roumaines Path. Expér. et Microbiol.* 1948, v 15, Nos 1/2, 199-224, 15 figs & 7 graphs (4 folding)

Disorganization occasioned by war was in part responsible for a very serious epidemic of malaria in the Tulcea District of Rumania. The Tulcea District lies between the lower reaches of the Danube and the Black Sea coast. It has a population of about 120,000. *Anopheles clutus* [*sacharovi*] and *A. maculipennis atroparvus* are both prevalent. Malaria endemicity was high in 1939. Epidemic outbreaks occurred in 1940-1942 as the result of the colonization of non-immune settlers, without adequate protection. The *P. falciparum* epidemic afflicted the immigrant and indigenous populations alike. In 1938, 82 per cent of positive blood films contained *P. vivax*, 17 per cent *P. falciparum* (8,300 examined). In 1946, 12 per cent were *P. vivax*, 84 per cent *P. falciparum*, and 3.4 per cent *P. malariae* (16,011 films examined). The malaria death rate in 1946 was 210 per 100,000.

The organization set up to combat the deplorable health conditions that the epidemic had brought to light comprised a polyvalent Health Centre in the town of Tulcea in constant liaison with 36 rural health centres, newly created, a mobile dispensary containing a diagnostic laboratory, 2 antimalaria stations, and a malaria diagnostic and treatment centre at Isaccea. The Tulcea Hospital and rural district hospitals gave medical assistance. The medical staff included 12 health officers, 8 specialists, 1 bacteriologist, 2 entomologists, 41 health visitors, 15 midwives, 24 sanitary inspectors, and 20 drug distributors. Voluntary organizations also rendered assistance, notably the Rumanian Red Cross Society who provided 23 additional nurses and antimalarial drugs received from the League of Red Cross Societies. The effort achieved remarkable success as evidenced by the vital statistics that are produced. The infant mortality rate during the first half of 1948 was 60 per cent lower than in the corresponding half of the previous year.

In 1943, *A. m. atroparvus* and *A. sacharovi* were prevalent along the coast and *A. m. messeae* was predominant in freshwater breeding places in the Danube Valley and in the north-west of the district. In *A. sacharovi* areas the infection rate (sporozoites and oöcysts) averaged 2.64 per cent. *A. sacharovi* was found for the first time in the Danube Delta at Sulina in 1948, the extension of this species in the delta might have grave consequences.

The height of the malaria epidemic was in the autumn of 1946. In October of that year some 15,500 cases were recorded and the monthly incidence continued above 13,500 for the rest of that year. A constant decline in incidence

did not occur till October 1947 consequent upon the systematic treatment of patients and parasite carriers. The treatment consisted of seven days atabrin (mepacrine or its equivalent followed, after an interval, by five days of plasmoquine. It is estimated that 80 per cent. of new patients and those with relapses were so treated. After 18 months of such treatment epidemic waves were suppressed, malaria mortality was reduced by 83 per cent. and endemic index by 68 per cent., the proportion of *P. falciparum* infections fell to 25 per cent. a normal proportion for Rumania.

The authors insist however that, in the circumstances prevailing drug treatment is not enough: they recommend in addition the spraying of dwellings with a residual insecticide in regions of such high anopheline density. A small experiment with DDT spraying has been made with promising results.

Norman H. Aik

WALLACE R. B. Mass Suppression with Chloroquine. Chloroquine and Pentaquine and Neo-Premaltin. *J. Trop. Med. & Hyg.* 1949 May 52, No. 5 83-106 6 charts & 3 maps.

The experiments described were carried out on a rubber estate in Malaya of over 10 000 acres. Surrounded on three sides by jungle-covered hills, it is typical *A. maculatus* country with ravines, seepages, streams and drains with clear running water. All the eight divisions of the estate are malarious, some hyperendemic. Before Japan entered the war anti larval measures were carried out under strict control but did not prevent the seasonal epidemics of malaria that occurred with unflinching regularity. Suppressive treatment with atabrin (now mepacrine) was tried in the worst malarial divisions from 1932 onwards and continued until the war with Japan. It proved to be the most effective measure of control so far tried in that area. Now mass suppression of malaria with drugs is the only control measure used. It is more effective and cheaper than antilarval measures in this particular area. The latter never prevented seasonal epidemics: atabrin did. The newer insecticides are now on trial, however.

The experiments described were largely confined to Indian members of the mixed population: they are more amenable to discipline and take drugs more readily than the Malaya, Chinese and Japanese. The population of each division was divided into two groups, X and Y. Group X was given the new drug, Group Y a harmless placebo. The year 1948 was an unfortunate one for the experiment. The early high prevalence of *A. maculatus* indicated severe malaria epidemic to follow, but unusual high storms that lasted fortnight occurred when the *A. maculatus* curve was at its height and caused a rapid fall in the prevalence of the vector. No malaria epidemic ensued, except in one area in which chloroquine was being tried. There was an unusual and unexpected increase in malaria prevalence in July-August.

Chloroquine diphosphat tablets were used, each of 0.3 gm. (containing 0.15 gm. base). They were given once a week, the dose varying from one-tenth of a tablet for infants under six months to two tablets for ages 14 years and over. There were 100 persons in Group X and 53 in Group Y. The drug, given from March 2nd to June 1st. There was complete protection for the group on suppression. There were no toxic effects. During April 40 per cent. of the control group were admitted to hospital for malaria. Thereafter the control group also received chloroquine. Most of the cases that occurred in June, July and August were from the original control group. When atabrin was used as a prophylactic there was always a marked rise in the malaria rate some three weeks after medication ceased. After chloroquine there were only three cases in the first month: one subtertian and two benign tertian.

Chloroquine and pentaquine were given in tablets, each containing 0.15 gm chloroquine base and 0.015 gm pentaquine base the dosage was the same as for chloroquine [these doses are given in terms of base only] Group X contained 158 and Group Y 137 persons. The drugs were given from March 2nd to June 1st and from July 30th to October 1st. In this area the expected epidemic did not materialize, there were no cases in May. In June and July when an unusual wave of malaria occurred there were 1 and 19 cases in Group X, and 12 and 20 in Group Y. At the end of July both groups received treatment, all available labour was then needed.

The test was not a severe one, but chloroquine and pentaquine gave complete protection. In April there were seven cases in the control group and none in Group X. The fall in malaria incidence in August was remarkable, only one case occurred. There was no case in September among the treated, among the Malays there was a 5 per cent incidence. There were no toxic effects of any importance.

Neo-Premaline was given in tablets, in the case of two divisions. Each tablet contained chloroquine base 0.15 gm, pamaquin base 0.0075 gm, and rhodoquine base 0.0075 gm [doses given in terms of base only]. The dosage was the same as for other drugs. In Division H Group X contained 123 and Group Y 109 persons. The drugs were given from March 17th to June 30th. In April the malaria rate was 6 per cent in the control group, there was no case in the treated group. During the whole period there were 19 cases from Group Y, one from Group X. The parasite rate in Group X fell from 7 per cent to nil. In the control group it rose to 20 per cent then gradually fell to 5 per cent in June as the malaria wave receded. There were no toxic effects from the drugs.

The results obtained with all three drugs were impressive and warrant further trial.

Norman White

CHWATT, L. J. *Anopheles gambiae melas* Control by Swamp Drainage in a Coastal Zone of Nigeria, British West Africa. *Mosquito News* 1949, June, v. 9, No. 2, 56-68, 4 figs. [15 refs.]

Coastal swamp drainage as a means of permanent control of the breeding places of *Anopheles melas* was carried out by Dr. A. B. GILROY between 1942 and 1947 at Lagos in Nigeria and is fully described in his monograph "Malaria Control by Coastal Swamp Drainage" [this *Bulletin*, 1948, v. 45, 1043]. The author of the paper under review reiterates these methods and tabulates annual results till 1947 in terms of average *Anopheles* density index (*melas* only) in two typical zones, contrasting figures of daily anopheline larvae collections per acre of water surface in drained and undrained swamps are quoted, e.g., 28.4, 1,734.8.

By the end of 1946, approximately 20 miles of embankment had been constructed to exclude sea-water from a total swamp area of 4,195 acres, associated "internal" drainage amounted to a length of 130 miles and 21 sluice gates were necessary. By this means the town and harbour works of Lagos (pop. 200,000) have been almost cleared of *Anopheles melas* as evidenced by a fall in average *Anopheles* density in the port zone from 47 *melas* per room in 1942 to 2.2 for the worst quarter of 1947. Contrary to expectations, little breeding of *melas* occurs in the drains, larvae may be found in pools caused by temporary obstruction, over 50 per cent of larvae are first or second instar, and pupae are rare, cyclical rise and fall of water level and the presence of larvivorous fish are important factors. Constant vigilance by the Government Malaria Unit is essential.

The author categorically rules out the use of residual insecticide (DDT) as a sole measure of control of *A. opifera* *melas* under these conditions because "there are only few human habitations within or in the vicinity of the main breeding area." The value of reclaimed land is an important side issue. The author believes the results attained in the Lagos area justify the use of coastal swamp drainage even though more modern methods of control are available.

R. Ford Treloar

LIVDORF, H. Crustacea copépodes comme ennemis naturels de larves d'anophèles. [Copepods as Natural Enemies of Anopheline Larvae.] *Bull. Soc. Path. Exot.* 1948 v. 4, No. 58, 178-9.

NAIR, C. P. Investigation on DDT Barrier Spray in Malaria Vector Areas in Malaya. *Med. J. Malaya* 1949 June v. 3, No. 4 250-58.

In 1945 in the township and outskirts of Klang four sites, each of which included a control, were selected to test the residual action of 5 per cent DDT in kerosene on the local malaria vectors, *A. maculatus*, *A. letifer* and *A. sundanensis*. On the first occasion spray was applied in atomized form to the interior of dwellings to the outer surfaces of walls and to vegetation etc., covering a surrounding zone fifty yards in width measured from the perimeter of the site. Interior space spraying was not included in subsequent sprayings and the later sprayings towards the end of the four-month test period were applied to the protective 50-yard barrier only. The quantity of spray used per acre on any one site remained the same irrespective of the surfaces treated and was approximately five gallons. Early in the test period the appearance of any mosquitoes was the signal for re-spraying but subsequently the occurrence of anophelines only was followed by a repeat treatment. From his observations the author concludes that the period after spraying for a build-up of mosquitoes to 10 per cent of normal population is 10 days on the outskirts and 1 day in the town or for anophelines 13 and 15 days respectively. Return to normal of the general mosquito population occurred after six weeks. The best results were obtained by the barrier spray only without the use of any of the fixed quantities of insecticide in treatment of the dwellings.

[From the tabulated data the reviewer finds the above-quoted assessment of results difficult to follow.]

R. Ford Treloar

TETELAFF, F. Malaria Control Progress and Problems. *J. National Malaria Soc.* 1949 June v. 3, No. 2, 115-20 3 figs.

The programme for the elimination of malaria from the U.S.A. within the five years beginning in 1947 depends on Federal and State participation. There has been a steady increase in State activities which now makes their contribution about equal to that of the Federal authorities. As a result of this and the favourable progress of the campaign it has been possible to modify the criteria on which areas are considered malarious and requiring treatment making them much more stringent than before.

In 1948 the number of houses treated was 1,374 '66 the usual treatment being a single season application of DDT at a rate of approximately 200 mgm. per sq. ft. (7 oz. per 100 sq. ft.) of wall and ceiling surfaces in homes on the back and inside of furniture on front and back porches and in privies. *A. quadrimaculatus* are now found in 8 per cent of sprayed houses which compares with 1.0 and 1 per cent in 1946 and 1947 when more frequent treatments were given. The number of cases of malaria is not stated.

There have been complaints that fly control has not been as satisfactory as in previous years which is explained partly by fly resistance and partly by the manner in which refuse is handled and possibly by unsatisfactory DDT concentrates. This is regretted because fly control is an important means of securing local co-operation.

A number of alternative insecticides have been tried out, but DDT as it is now being used is still the most effective and most economical one available.
G. Macdonald

GAHAN J B, DOWNS W G & CLISS H. Control of *Anopheles pseudopunctipennis* in Mexico with DDT Residual Sprays applied in Buildings. Part II. *Amer J Hyg* 1949, May, 49 No 3, 285-9.

In a previous paper [this Bulletin, 1947, 41, 880] encouraging entomological results were recorded in the initial stages of the use of residual sprays (1945) in villages in Mexico where the vector of malaria, *A. pseudopunctipennis*, breeds in rice-fields. The application of DDT either in emulsion or wettable powder form was continued through 1946, 1947 and 1948, and when checked the dosage was 238 milligrammes per square foot. Internal wall and roof surfaces of all dwellings and other buildings were treated once each year. Adult mosquitoes collected in houses have been reduced to very small numbers (e.g., 92 to 0.5 per house) but this method of checking offers little proof of lethal effect: mosquitoes are seldom found dead in buildings, suggesting that they leave after contact with a lethal surface. Special emphasis was therefore attached to estimation of larval abundance in the rice-field. Average counts of *Anopheles* larvae obtained by dipping are tabulated for each month of the three years 1945, 1946 and 1947, the counts having been made on approximately the same date each year. For example at one village untreated in 1945 the average number of larvae per dip for all observations in 1945, 1946 and 1947 were 3.44, 0.61 and 0.28 respectively. It is evident that the DDT applications did not kill enough adult mosquitoes to reduce the breeding in the surrounding rice-fields, but the continued presence of larvae after three years of residual insecticide application does not suggest that this sole method of control will eventually eradicate *A. pseudopunctipennis* from these localities. Laboratory tests were carried out to determine whether resistant strains of anophelines had developed after four annual sprayings: there was no evidence of such strains. The effect of this work on malaria incidence is to be reported later.

R. Ford Frederic

GIGLIOLI G. Mosquito Eradication. [Correspondence] *Brit Med J* 1949, Sept 10, 595.

Dr Giglioli in reference to a leading article in the *Brit Med J*, 1949, July 23, 222 on mosquito eradication gives a salutary reminder that measures of malaria control whether by means of residual insecticides or by older methods, cannot be effective or economically sound unless they are applied with an intelligent knowledge of local epidemiological conditions. Especially important is the study of the bionomics of the local vectors: results obtained in Cyprus, Sardinia and British Guiana are cited to show that their significance is strictly limited to the local vector and ecology.

With the use of residual spraying methods, a knowledge of breeding habits is not enough: the feeding, biting and resting habits of the adult insects must be thoroughly understood. Anthropophilic and domestic species (e.g., *Anopheles darlingi* and *Aedes aegypti*) are specifically vulnerable to residual techniques and have been eradicated by these methods alone in settled areas of British Guiana, under a wide range of environmental conditions which are fairly typical of a large part of tropical South America. On the other hand, mosquitoes which bite in the open and do not enter houses, such as *A. bellator* in bromeliads in Trinidad

can be expected to be as refractory to residual spraying as they are to conventional hydrological control.

Between these extremes are species which are only partly domestic and anthrozoophilic in their biting habits, e.g. *A. albimanus* and *A. aquasalis*. With these, residual methods only give partial results: those mosquitoes actually entering houses can be eliminated, and malaria transmission thereby reduced, but the total species population will hardly be affected. Residual house-spraying has had no effect whatever on the population of *A. aquasalis* in British Guiana.

While localized eradication of *Aedes aegypti* and *Anopheles darlingi* has been achieved under continental conditions in British Guiana, the possibility of re-invasion remains if periodical application of DDT is not continued indefinitely. Nevertheless with adequate local topographical and ecological knowledge spraying operations can be confined to a number of strategic localities and advantage taken of natural barriers to different species: even under continental conditions, natural obstacles may be found and exploited, through a complete knowledge of the biology of local vectors and local environmental conditions.

The author's main thesis is contained in his wise observation: "Generalizations in the malariological field are no more warranted to-day than they were yesterday: before the introduction of residual insecticides."

II J. O'D. Burke-Gaffney

DE MELLO, P. J. & PIROO, O. da S. Contribuição à melhoria do equipamento para desinfestação domiciliares. [Improvements in the Methods of Insecticidal Spraying of Houses.] *Rev. Brasileira Malariologia*. Rio de Janeiro, 1949 Apr. v. 1 No. 2, 100-102, figs.

Two improvements in methods of treating houses with residual insecticidal spray are described. (1) For spraying numerous rooms in large buildings it is convenient to use a petrol compressor which supplies compressed air along a lead to an insecticide container which is taken into the building (apart from if necessary). The container is a 30-litre cylinder which carries 15 litres of DDT solution and a 15-litre air space for compressed air (at 25 lb. per sq. inch). Several keels can be taken off this container allowing men to operate simultaneously from the same supply. (2) For purposes of estimating quantities of spray required, it is desirable to measure the surface area of rooms to be sprayed. Two simple instruments enable this to be done very rapidly. (a) An extensible rule is used to find the height of the ceiling. (b) To obtain the perimeter a wheel of suitable size fixed in a revolution counter is run round the walls of the room. The product of perimeter and height give a rough guide to surface area.

J. R. B. Mace

- I. DE BUSTAWANTE, F. M., FERREIRA, M. O. & RACIOL, R. L. D. aplicação extradomiciliar de DDT por helicóptero no combate aos anofelinos do subgênero *Herzianus* em matas primárias com predominância de bromélias epífitas. [Application of DDT and Benzene Hexachloride by Helicopter in the Attack on Anophelines of the Sub-Genus *Herzianus* in Forests where Epiphytic Bromeliads predominate.] *Rev. Brasileira Malariologia*. Rio de Janeiro, 1949 Apr. v. 1 No. 2, 62-69, 1 graph, 16 refs.
- II. FERREIRA, M. O., RACIOL, R. C. & DE BUSTAWANTE, F. M. Da aplicação extradomiciliar de hexaclorobenzeno por meio de helicóptero no combate aos anofelinos do sub-gênero *Herzianus* em matas primárias com predominância de bromélias epífitas. *Ibid.* 69-69, 3 figs.
- i. In the state of Santa Catarina malaria is transmitted by Anophelines of the sub-genus *Herzianus* which breed in the axils of bromeliads. In some areas

where the bromeliads are terrestrial, malaria control can be done by destroying all the plants of this type in the neighbourhood of the towns. But in other districts, the bromeliads are epiphytic, in dense natural forest, and their destruction is very difficult. This paper records attempts to destroy the mosquitoes and the larvae breeding in the bromeliads by dusting DDT over the forest from a helicopter.

A Bell model 47 helicopter was used, weighing 691 kgm and capable of carrying 130 kgm of insecticide (or up to 180 kgm on short flights, by reducing the fuel carried). A 10 per cent DDT dust called "Gyron" (Geigy Co, Brazil) was employed. Applications were made to two test wooded areas of 100 and 30 hectares respectively.

The effects of treatments were judged by the following observations made before and after treatment in the test woods and in another control wood about 30-40 km distant —

(1) Night catching at 4 or 5 human baited traps per wood. This indicated effects on adult mosquitoes.

(2) Larval density per bromeliad was determined by searches at intervals, and also special observations were made on larvae placed in marked bromeliads shortly before treatment.

The results of applications of 900 gm DDT per hectare (13 oz/acre) gave a reduction of adults from 92 to 99.8 per cent (as compared with observations before treatment) for 25 days after application. The effect on larvae was only 77 per cent reduction at 24 to 48 hours but the numbers subsequently declined owing to the high kill of adults. Treatment with DDT at 1,300 gm per hectare (19 oz/acre) in another wood gave 90.3 per cent reduction in adults, reaching 78 to 100 per cent at 16 days after treatment. The kill of larvae was better, being 94 per cent (one day) and 98 per cent (one week) after treatment.

ii. Similar experiments were carried out with gamma BHC preparations. A dust "Gamorial" containing 1½ per cent gamma isomer (Duperial Co) was applied at the rate of 150 gm active principle per hectare (about 2 oz/acre). This gave a 99.23 per cent reduction of adult mosquitoes on the second night after treatment. For four days the population of *Kerteszia* remained low but after six days, reinfestation began to be evident. This treatment had no appreciable effect on larvae.

A treatment with "Agroside" containing 6½ per cent gamma isomer (Duperial Co) in 10 per cent aqueous suspension was made at the rate of 156 gm active principle per hectare. This reduced adult mosquitoes by 86 to 100 per cent from the second to twelfth day, but reinfestation began to be appreciable thereafter. Unlike the powder treatment, the "Agroside" reduced the larvae by 90 per cent on the third day after treatment.

[The large percentage reductions in the tests reported in these two papers are partly offset by a substantial natural decline over the period of the experiment e.g., adults captured in the control wood showed a reduction of 23 to 94 per cent (average 70 per cent) as compared with the period before treatment.]

J R Busvine

RUSKIN, A & RIGDON, R H. The Electrocardiogram of Normal and Malaria-Infected Monkeys. *J Lab & Clin Med* 1949, Aug, v 34, No 8, 1105-8, 1 fig.

' 1 The normal electrocardiogram of the *Macaca mulatta* monkey is between that of the dog and man. The variability includes negativity of the T waves in Leads I, II, and IV F, and displacement of the S-T segments from the iso-electric line.

" 2 The electrocardiogram of malaria-infected *Macaca mulatta* monkeys does not differ from that of the controls in the great majority of instances. The rare

exceptions include marked (left) axis deviation and slight prolongation of the Q-T interval. No typically anoxicemic electrocardiographic changes were demonstrated even in monkeys showing red blood cell counts only 25 per cent of normal.

3 The absence of significant electrocardiographic alterations in monkeys infected with *P. knowlesi* is consistent with the known pathologic changes in malaria in monkeys and with the findings of others in a large series of cases of malaria in human beings."

LLOYD, O. C. & SOMMERVILLE, T. The Fate of Sporozoites of *Plasmodium cynomolgi* Injected into the Skin of Rhesus Monkeys. [Abstract.] *J. Path. & Bact.* 1949 Jan. v. 61 No. 1 144-6.

This paper summarizes the more important results of an investigation in monkey malaria [see this *Bulletin* 1947 v. 44 896]. The details of the work are given in a thesis by the first author for the Cambridge University doctorate of medicine. Mosquitoes infected with *Plasmodium cynomolgi* were ground in monkey serum and injected into the abdominal skin of Rhesus monkeys. Each monkey received two injections simultaneously, the inocula being the product of 50 mosquitoes. At varying periods (minutes, hours and days) the skin at the two sites was excised: one portion was prepared for section, the other was transplanted in a clean monkey. At similar periods blood was drawn from the infected animals and inoculated into others. Unlike the results of HOFF and COCHRAN's experiments with avian malaria (this *Bulletin* v. 1943 v. 4, 538) no local development of the sporozoites was detected. The sporozoites persisted in large numbers for two hours in that part of the skin which had yet to be invaded by inflammatory cells, viz. in the central liquid part of the inoculum. By four hours the sporozoites had vanished. The parallel experiments with subinoculated skin and blood confirmed these results—the monkeys developing malaria up to a maximum of two hours after having received these inocula. Subinoculations of blood taken at 20 and 40 minutes after the inoculations gave rise to infections in the recipients indicating that sporozoites were circulating in the donor's blood during this time. Under the conditions of these experiments it seems unlikely that sporozoites gained an entry into the blood before 20 minutes.

The authors conclude that many sporozoites are killed at the local site probably by the lytic action of phagocytes; others escape from the area probably by the lymphatics via the thoracic duct to the blood stream. Under natural conditions after the bite of an infected mosquito the sporozoites may either enter the blood stream directly after penetration of the proboscis into a capillary or via the lymphatic route. In the former case they will be demonstrable immediately (as in FAIRLEY's work see this *Bulletin* 1945 v. 4, 630) in the latter not until 20 minutes or so have elapsed (as in these experiments).
P. C. C. Garnham

TALLAFERRO W. H. KELSEY F. E. TALLAFERRO LOYD G. The Role of the Spleen and the Lymphoid-Macrophage System in the Quinine Treatment of Gallinaceum Malaria. I. Acquired Immunity and Phagocytosis [TALLAFERRO W. H. *J. J. Res. Dis.* 1948 Sept. Oct. v. 83 No. 164-80, 4 figs. II. Quinine Blood Levels TALLAFERRO W. H. & KELSEY F. E. *Ibid.* 181-99 7 figs. III. The Action of Quinine and of Immunity on the Parasite TALLAFERRO W. H. & TALLAFERRO LOYD G. *Ibid.* 1949 Mar. Apr. v. 84 No. 2 187-220 10 figs. (Numerous refs.)

I. It is possible that in chemotherapy the importance of the part played by the host in combating infections and producing cures has been underrated.

An active role has however been assigned by some authors to certain body cells such as those of the lymphoid-macrophage system which are believed to act in conjunction with drugs. The theories expressing these beliefs are outlined by the authors as follows —

- 1 The drug acts chiefly, or in large part, by stimulating immunity
- 2 The drug indirectly kills the invading organism by an opsonin-like action which makes the parasite more easily phagocytosed
- 3 The drug is fixed or absorbed by the reticulo-endothelial system in such a way that its redistribution facilitates a longer drug-parasite contact
- 4 The drug is converted by the reticulo-endothelial system (or other tissue) into a more chemotherapeutically active metabolic transformation product
- 5 The drug inhibits reproduction of the invading organism which then becomes more vulnerable to the phagocytes or other defence mechanisms

The present investigation was designed to test these theories with special reference to the spleen, during the quinine treatment of *P. gallinaceum* infections of chickens and provided little or no support for them. The chickens used were kept on an alternate light and dark schedule for twelve hours and were infected by parasitized blood or sporozoites intravenously. Blood smears were examined once per day or more frequently during the course of the infection and the parasite counts were recorded per 10,000 red blood cells. Quinine dihydrochloride was given orally in capsules or intravenously according to body weight. Experimental results showed that splenectomy increased the mortality of treated and untreated chickens in comparable degree and indicated that the activity of quinine was not affected by this organ. Its removal lessened acquired but not innate immunity. The increase in acquired immunity produced by the spleen during infection is responsible for the crisis and subsequent low rate of parasitaemia. Observations on phagocytosis during the period of innate immunity in the case of blood-induced infections, treated with quinine indicated that the drug did not increase the phagocytic activity of macrophages of liver and spleen, which was marked, or those of bone-marrow which was much less intense. It appeared also that quinine did not make the parasites more easily phagocytosed, *i.e.*, possessed no opsonin-like activity. The results obtained during acquired immunity of blood- or sporozoite-induced infections led to conclusions similar to those above. Apart from the decreased phagocytosis associated with inhibition of parasitic growth and reproduction, histo-pathological studies failed to reveal any alteration in defence processes resulting from quinine treatment of the chicken host. The authors concluded that the spleen and the drug acted independently in suppressing infection.

II In this paper the mechanism whereby splenectomy appears to decrease the suppressive value of quinine in *P. gallinaceum* infection of chickens was investigated further by studying the course of infections in groups of splenectomized and non-splenectomized birds which did or did not receive quinine. In spite of the fact that quinine blood levels were raised and maintained for a longer time in the infected splenectomized chickens, the value of such increases was offset by the decrease in acquired immunity to which that organ gives rise. The rise in blood levels may have resulted from the infection *per se*, as earlier authors had found that for a given dose of quinine the concentration of the drug in tissues was frequently higher in infected than in non-infected chickens. On the other hand the rise may have followed splenectomy *per se* or, as also previously recognized, from the increased parasitaemia in absence of that organ with resultant more marked anaemia. There was a negative correlation between the quinine blood level and the number of red cells. The effect of quinine therapy on acquired immunity due to the spleen, as a result of specific and non-specific stimulation of that organ,

exceptions include marked (left) axis deviation and slight prolongation of the Q-T interval. No typically anoxicemic electrocardiographic changes were demonstrated even in monkeys showing red blood cell counts only 25 per cent of normal.

"3. The absence of significant electrocardiographic alterations in monkeys infected with *P. knowlesi* is consistent with the known pathologic changes in malaria in monkeys and with the findings of others in a large series of cases of malaria in human beings."

LLOYD O. C. & SOMMERTRUP T. The Fate of Sporozoites of *Plasmodium cynomolgi* Injected into the Skin of Rhesus Monkeys. Abstract J Path. & Bact. 1949 Jan. v 61 No. 1 144-6.

This paper summarizes the more important results of an investigation in monkey malaria [see this Bulletin, 1947 v 44 866]. The details of the work are given in a thesis by the first author for the Cambridge University doctorate of medicine. Mosquitoes infected with *Plasmodium cynomolgi* were ground in monkey serum and injected into the abdominal skin of Rhesus monkeys. Each monkey received two injections simultaneously, the inocula being the product of 50 mosquitoes. At varying periods (minutes, hours and days) the skin at the two sites was excised: one portion was prepared for section, the other was transplanted in a clean monkey. At similar periods blood was drawn from the infected animals and inoculated into others. Unlike the results of HUFF and COULTER's experiments with avian malaria this Bulletin 1945 v 4, 538, no local development of the sporozoites was detected. The sporozoites persisted in large numbers for two hours in that part of the skin which had yet to be invaded by inflammatory cells, viz in the central liquid part of the inoculum. By four hours the sporozoites had vanished. The parallel experiments with subinoculated skin and blood confirmed these results—the monkeys developing malaria up to a maximum of two hours after having received these inocula. Subinoculations of blood taken at 20 and 40 minutes after the inoculations gave rise to infections in the recipients, indicating that sporozoites were circulating in the donor's blood during this time. Under the conditions of these experiments it seems unlikely that sporozoites gained an entry into the blood before 20 minutes.

The authors conclude that many sporozoites are killed at the local site probably by the lytic action of phagocytes; others escape from the area probably by the lymphatics via the thoracic duct to the blood stream. Under natural conditions after the bite of an infected mosquito the sporozoites may either enter the blood stream directly after penetration of the proboscis into capillary or via the lymphatic route. In the former case they will be demonstrable immediately (as in FAIRLEY's work, see this Bulletin 1945 v 42, 630); in the latter not until 20 minutes or so have elapsed (as in these experiments).
P. C. C. GERRARD

TALIAFERRO W. H. & KELLEY F. E. TALIAFERRO LOYD G. The Role of the Spleen and the Lymphoid-Macrophage System in the Quinine Treatment of Gallinacorum Malaria. I. Acquired Immunity and Phagocytosis [TALIAFERRO W. H. J. J. Fed. Dis. 1948 Sept. Oct. v 83 No. 1 164-80] 4 figs. II. Quinine Blood Levels TALIAFERRO W. H. & KELLEY Ibid. 181-99 7 figs. III. The Action of Quinine and of Immunity on the Parasite TALIAFERRO W. H. & TALIAFERRO, LOYD G. Ibid. 1949 Mar.-Apr. v 84 No. 2, 187-220 10 figs. (Thurston's refs)

I. It is possible that in chemotherapy the importance of the part played by the host in combating infections and producing cures has been underrated.

An active role has however been assigned by some authors to certain body cells such as those of the lymphoid-macrophage system which are believed to act in conjunction with drugs. The theories expressing these beliefs are outlined by the authors as follows —

- 1 The drug acts chiefly, or in large part by stimulating immunity
- 2 The drug indirectly kills the invading organism by an opsonin like action which makes the parasite more easily phagocytosed
- 3 The drug is fixed or absorbed by the reticulo-endothelial system in such a way that its redistribution facilitates a longer drug-parasite contact
- 4 The drug is converted by the reticulo-endothelial system (or other tissue) into a more chemotherapeutically active metabolic transformation product
- 5 The drug inhibits reproduction of the invading organism which then becomes more vulnerable to the phagocytes or other defence mechanisms

The present investigation was designed to test these theories, with special reference to the spleen during the quinine treatment of *P. gallinaceum* infections of chickens and provided little or no support for them. The chickens used were kept on an alternate light and dark schedule for twelve hours and were infected by parasitized blood or sporozoites intravenously. Blood smears were examined once per day or more frequently during the course of the infection and the parasite counts were recorded per 10 000 red blood cells. Quinine dihydrochloride was given orally in capsules or intravenously according to body weight. Experimental results showed that splenectomy increased the mortality of treated and untreated chickens in comparable degree and indicated that the activity of quinine was not affected by this organ. Its removal lessened acquired but not innate immunity. The increase in acquired immunity produced by the spleen during infection is responsible for the crisis and subsequent low rate of parasitaemia. Observations on phagocytosis during the period of innate immunity in the case of blood-induced infections, treated with quinine indicated that the drug did not increase the phagocytic activity of macrophages of liver and spleen which was marked or those of bone-marrow which was much less intense. It appeared also that quinine did not make the parasites more easily phagocytosed i.e. possessed no opsonin-like activity. The results obtained during acquired immunity of blood- or sporozoite-induced infections led to conclusions similar to those above. Apart from the decreased phagocytosis associated with inhibition of parasitic growth and reproduction, histo pathological studies failed to reveal any alteration in defence processes resulting from quinine treatment of the chicken host. The authors concluded that the spleen and the drug acted independently in suppressing infection.

II In this paper the mechanism whereby splenectomy appears to decrease the suppressive value of quinine in *P. gallinaceum* infection of chickens was investigated further by studying the course of infections in groups of splenectomized and non-splenectomized birds which did or did not receive quinine. In spite of the fact that quinine blood levels were raised and maintained for a longer time in the infected splenectomized chickens, the value of such increases was offset by the decrease in acquired immunity to which that organ gives rise. The rise in blood levels may have resulted from the infection *per se*, as earlier authors had found that for a given dose of quinine the concentration of the drug in tissues was frequently higher in infected than in non-infected chickens. On the other hand the rise may have followed splenectomy *per se* or, as also previously recognized, from the increased parasitaemia in absence of that organ with resultant more marked anaemia. There was a negative correlation between the quinine blood level and the number of red cells. The effect of quinine therapy on acquired immunity due to the spleen, as a result of specific and non-specific stimulation of that organ,

MITHROW KENNEDON, Lillie & KENNEDON, E. Die Entwicklung von *Plasmodium calhemum* im Erythrocyt und im Blut des Kanarienvogels. [The Development of *Plasmodium calhemum* in the Erythrocytes and Blood of the Canary.] Reprinted from *Zool. Jahrbücher (Anatomie)* 1949 Feb. 35 v. 70 No. 1 129-58 3 text figs. & 17 text. on foldin. pl. (28 refs.)

In this paper—which was completed in 1935—the authors give a detailed account of the entire exoerythrocytic (EE) development of *Plasmodium calhemum* in the canary. This is compared with *P. falciparum*—the life-cycle of which was previously (1943-1944) described by them in this *Bulletin* 1944 v. 41 190.

The infections in the forty canaries used in their experiments were in most cases produced by inoculating the birds intramuscularly into the breast with 0.2 cc. of a saline suspension of teased-up and filtered heads and thoraxes of infected *Culex* mosquitoes, each bird receiving about 1000 sporozoites. The study of the life-cycle of *P. calhemum* was based on stained organ and tissue smears of the birds sacrificed at various intervals after the infection.

The early stages of the development of this parasite occur at the site of inoculation of the sporozoites, whence they invade all the organs, but show a predilection for the spleen, liver, and especially the brain in which the EE forms are found in the endothelial cells of the capillaries.

After a latent period of several hours the sporozoites at the site of inoculation are taken up by reticulo-endothelial cells (macrophages, monocytes). In these they become rounded and proceed to multiply by schizogony; giving rise to 32 nuclei 30 hours after inoculation of which about 15 hours are occupied by the first nuclear division. The merozoites of the first generation again find their way into phagocytes which carry them to the inner organs, where they continue to develop in the endothelial cells. The schizonts of the first generation give rise to macromerozoites, which are larger than the merozoites of the erythrocytic cycle. In subsequent generations a minority of the schizonts produce small merozoites (micromerozoites) morphologically indistinguishable from those of the erythrocytic cycle. The macromerozoites of the second generation begin to enter the blood stream 63 hours after the inoculation of sporozoites. They invade the red blood corpuscles giving rise to both the asexual and sexual (gametocytes) forms of the erythrocytic cycle, while the endothelial schizonts continue to produce macromerozoites by which the EE cycle is maintained in the host.

The maturation of each generation from the 2nd onward occupies about 30 hours in the case of macroschizogony, and 33 hours in the case of microschizogony; the number of merozoites resulting from the former being from 33 to 64 and from the latter 63 to 124. As the infection proceeds the ratio of microschizonts to macroschizonts in successive generations rises progressively. After some time the number of parasites both in the blood and in the tissues begins to diminish and the infection may finally assume a chronic character with scanty parasites, but liable to relapse. The course of *calhemum* infection in canaries varies, being in some cases rapid, with a fatal termination after 9-12 days, while in others the infection passes into a chronic phase after 2-3 weeks.

The authors have demonstrated by blood subinoculation—that the merozoites derived from erythrocytic schizonts are capable of initiating the EE cycle in the recipient host, from which it would seem that the macromerozoites may give rise to macroschizonts in the tissues of the bird. The two cycles—erythrocytic and exoerythrocytic—are therefore interchangeable.

The brief summary given above does not do full justice to the very thorough and detailed account, accompanied by tables and graphs, given in this paper. It is illustrated by a number of photomicrographs and contains references to the literature appearing after 1944.

In an appendix the authors discuss the recent findings regarding the EE stages of development in mammalian malaria parasites. C A Hoare

TRYPANOSOMIASIS

FERREIRA, F S da C, PINTO, A R & DE ALMEIDA, C L. Sobre o grau de infestação por tripanosomas das glossinas da Guiné Portuguesa [Trypanosome Infection Rates of Glossinae in Portuguese Guinea] *An Inst Med Trop* Lisbon 1948, Dec, v 5, 251-61, 1 folding map. English summary.

The authors dissected 2,055 tsetse flies and found 140 (6.81 per cent) of them infected with trypanosomes as follows: *Glossina palpalis*, 65 infected out of 1,607 dissected; *G. submorsitans*, 42 out of 263; and *G. longipalpis*, 33 out of 185. Polymorphic trypanosomes were seen in 61 flies (2.96 per cent of the dissections) and monomorphic trypanosomes in 63 flies (3.06 per cent). *Trypanosoma grayi* occurred only in *G. palpalis*, 7 flies (0.34 per cent) and unidentified trypanosomes were seen in 9 flies (0.43 per cent).

[These percentages are based on the total number (2,055) of flies dissected and are given in the summary but not in the text. Percentages given in the three tables are misleading because they are calculated on the total number of infections for all three species of *Glossina*, not on the number of dissections for each species separately; the conclusions regarding the infectivity rates of these three tsetse flies are based on these erroneous percentages.]

H S Leeson

TOWN, B W, WILLS, E D & WORMALL, A. Action of Suramin and "Antrycide" on Enzymes [Correspondence] *Nature* 1949, Aug 6, 233.

In a previous note the authors have shown [this *Bulletin* 1949 v 46, 914] that small concentrations of suramin exercise a strong inhibitory effect on hexokinase, urease, yeast carboxylase, succinic dehydrogenase and trypsin. Further investigation has confirmed that the inhibition of enzymes by suramin is relatively specific: some enzymes are inhibited only at particular hydrogen ion concentrations, and many are unaffected through the whole range of pH over which they act. Specific enzyme inhibition, deranging the trypanosome's carbohydrate or protein metabolism or both may account for the chemotherapeutic activity of suramin.

Although antrycide is very different from suramin chemically, the authors thought it possible that the two compounds might act in a similar way on some metabolic enzymes. They have found, however, that antrycide in relatively high concentrations has no inhibitory effect on urease, succinic dehydrogenase, the yeast enzymes concerned in the fermentation of glucose or on trypsin. Therefore, while suramin may perhaps act on trypanosomes by inhibiting carbohydrate metabolizing or proteolytic enzymes of these organisms, the mechanism of antrycide activity is probably different from that of suramin. E M Lourie

BUXTON, P. A. Presidential Address on Control of Tsetse Flies by Human Settlement. *J. Roy. San. Inst.* 1949 Sept. & Oct. No. 5, 615-16.

In this short Presidential address the author introduced the subject in such a way that people not familiar with sleeping sickness work would be able to follow his reasoning. One important point is that the veterinary aspect of trypanosomiasis (and therefore indirectly the agricultural and medical aspects) is more important than the present low rate of spread of the disease in man. Loss of cattle from the trypanosomiasis means poor agriculture and therefore poor nutrition. A second point is that the settlements created in Tanganyika where the people have been concentrated, and from which *G. morsitans* has largely retreated, held 100 000 people in 1946—some of these settlements have been in existence for 20 years. The Anchar settlement in Nigeria is perhaps the most interesting public health experiment in Africa—it needed the combined efforts of medical men and entomologists together with those of persons who knew and took into account the African social conditions and agricultural customs (and modified them). Charles H. J. Cook

HENITT, R. I., GEMMEL, A., KUSH, R. S., SAPIR, S. R., BRANCO, F. L. M. & SHARON, Y. Experimental Chemotherapy of Trypanosomiasis. I. Effect of *p*-Phenylene Diguandine and Related Compounds against Experimental Infections with *Trypanosoma equiperdum*. *J. Pharm. & Exper. Therap.* 1949 July & Oct. No. 9, 305-14.

Among compounds examined since 1944 for chemotherapeutic effect against trypanosomiasis *p*-phenylene diguandine seemed worthy of detailed study. It was found to be curative for *T. equiperdum* infections in mice and rabbits but was much less effective than arsenicals, suramin or stilbamidine when administered parenterally. Given orally in divided doses over a period of 31 days, it behaved somewhat better. It was five times more effective than suramin and one-sixth as effective as stilbamidine. The ratio of curative dosage on oral treatment to curative dosage on intraperitoneal treatment was 500 for suramin, 120 for stilbamidine and 5 for *p*-phenylene diguandine.

Of closely related aromatic guanidines none proved more potent than *p*-phenylene diguandine.

No compound in this group exercised any action against *Leishmania donovani* in hamsters, *Schistosoma mansoni* in mice, *Leishmanolux* in cotton rat, *Plasmodium falciparum* in duck or *Trypanosoma cruzi* in mice. F. M. Lewis

VEGHEE, A., ROMÁN, J. & NORONHA, R. Nuevos datos sobre la enfermedad de Chagas en Chile. [New Data on Chagas's Disease in Chile.] *Boletín Sanitaria Panamericana* 1949 Aug. 28, No. 8, 808-17, 2 figs. (1 ref.).

The English summary appended to the paper is as follows:—

The authors present the results of investigations on Chagas' Disease in Chile up to June 30 1948. During systematic epidemiological surveys made of representative sample zones affected by endemicity 14 481 persons were examined, resulting in a 1.7% infestation by *T. cruzi*. From the Tarapacá to the O'Higgins provinces 1 724 proved negative; were found 10 036 complement fixation test were made which showed positive in 14.25%. The average index for trypanomatoma from the Tarapacá to the Coquimbo provinces is 44.1% for 20 842 samples of *T. cruzi*. Its endoparasites 10.9% (positivity) was found in 4 008 domestic and wild animal examined. There were 411 confirmed acute cases found in the provinces of Santiago and Antofagasta and 174 in the province of Coquimbo as a result of clinical investigations with special reference

to cardiopathy Prevention of Chagas' Diseases was attempted by the application of DDT in all the rural zones The application of 1,132 houses with DDT—5% in kerosene—showed that it was possible to control the breeding of the triatoma in 90% of the cases, with a low index of them up to 12 months later Success was also obtained by the use of gammexane in smoke-generators The authors mention the laws which are in force covering the prevention of the disease, as well as bills submitted to congress on rural dwellings and programs for future clinical investigations "

PELLEGRINO, J Transmissão da doença de Chagas pela transfusão de sangue Primeiras comprovações sorológicas em doadores e em candidatos a doadores de sangue [Transmission of Chagas's Disease through Blood-Transfusion] *Rev Brasileira Med* Rio de Janeiro 1949, May, v 6, No 5, 297-301, 1 fig [Bibliography] English summary

In Belo Horizonte, Brazil, Chagas's disease is fairly common and the vectors are abundant, nevertheless many doctors fail to recognize the facts and do not take sufficient care when blood-transfusion is called for As syphilis, malaria, relapsing fever and other diseases may be thus transmitted the author has investigated the question of the possible infectiveness of blood donors How rife the infection is is evidenced by the fact that among 8,142 unselected country-dwellers 1,383 (17 per cent) reacted positively to a complement deviation test Xenodiagnosis is far from infallible in chronic cases and it is these who show few or no symptoms and who might be selected as donors for blood-transfusion

The author has tested 179 blood-donors in the Belo Horizonte Transfusions Service He found two who were on the establishment and a third who was offering himself as a donor giving a positive complement fixation and two other volunteers were doubtful All those positive had lived in *Triatoma*-infested houses, two of them showed no symptoms of infection One who had given 300 cc of blood on more than one occasion and showed no signs of infection nevertheless gave a positive Guerreiro-Machado reaction twice

The author in consequence recommends that the blood of all prospective donors should be tested for complement deviation and any giving a positive or a doubtful reaction should be excluded and that, if blood is needed urgently, only those donors should be used who are definitely known to be uninfected

H Harold Scott

DE FREITAS, J L P & DE ALMEIDA, J O Nova tecnica de fixação do complemento para moléstia de Chagas (Reação quantitativa com antígeno gelificado de culturas de *Trypanosoma cruzi*) [New Technique for Complement Fixation in Chagas's Disease] *Hospital* Rio de Janeiro 1949, June, v 35, No 6, 787-800 English summary

For the diagnosis of chronic Chagas's disease serological tests are best, in fact almost necessary, owing to the difficulty of finding the trypanosomes Davis's antigen is good but is not very stable so that constant control tests are necessary The author's method of preparation has given a better antigen and he describes it as follows —

A culture on blood-agar is made with trypanosomes obtained from human cases of the disease, and is suspended in physiological saline and centrifuged at 2,000 r p m three times for 30 minutes each time, until the supernatant fluid is colourless This is decanted and volume of the residue noted This is then subjected to a temperature of -30°C and dried *in vacuo* at room temperature over calcium chloride, usually this takes about 48 hours The residue is ground

and benzene five times the tested volume of the deposit is added and left at room temperature with frequent shaking and exchanging for fresh benzene during another 48 hours. The supernatant benzene is then removed and the deposit dried at 37°C. for 12 hours. Distilled water to nine times the volume of the sediment is next added and left at room temperature with repeated shaking and then are added three volumes of chloroform which produces a jelly like mass. This is shaken with glass beads and in a Roemer's shaker distributed in quantities of 0.9 ml. in tubes and stored at -20°C. This retains its potency for three months or more and it is neither haemolytic nor anti-complementary. The author claims that the thromboplastic activity of the antigen is negligible.

The test has been made with 500 sera divided into three groups. 1. Those known to be suffering from Chagas's disease by finding the trypomastotes in the blood in the case of living patients or by xenodiagnosis or by finding trypomastote forms in the heart post mortem. There were 32 in this group. 2. Normal subjects or patients suffering from diseases other than Chagas's disease presumably 350 in number as the other groups together account for 140. 3. One hundred and eighteen suspicious cases suspicious either from presenting suggestive symptoms or living in a Trypanosom-infested locality.

In the first group one gave a negative result although the result was positive. In three others the readings were negative after four hours in the ice-chest but were positive after two hours at 3-6°C. followed by 30 minutes at 37°C. in a water-bath. The titres in all these ranged between 1/2 and 4/6. Of those in the second group none gave a positive with a titre above 1/4. Of the 118 in group 3, nine gave a positive in titre of 1/4-1/8 and 104 a titre between 1/8 and 4/8. From group 2 those with 1/4 or less are regarded as negative and from group 1 those above 1/8 may be considered as definitely positive and the only difficulty arises among those with a titre of 1/4-1/8 in these the test should be repeated after a few days.

H. H. de Souto

DE BARROS, L. C. A electrocardiograma d forma crônica da moléstia de Chagas. [Electrocardiographic Changes in Chronic Cases of Chagas's Disease.] *Hospital Rio de Janeiro* 1940 31:3 33-35 15-30 18 figs. (18 ref.) English summary.

During the past five years, says the author, study of the electrocardiogram has been much intensified and the electrocardiographic picture has shown such variations that a full and detailed revision now was needed in order that one may know whether these tracings are peculiar to different phases of the disease or whether they may take on different forms in the sequelae.

The present study gives the results of such detailed study of 4 patients 3 of whom were shown to be genuine cases of the disease in that they all gave 3-plus or 4-plus reaction to the Michaelis-Ungerleider test. The findings and observations are and will be of the greatest interest to all cardiologists but are most of detailed interest for the general physician and the heart specialist. The heart disease is much more fully treated in this paper than in practice books in other countries. More than 170 changes were found and reproduced most of them unfortunately too small for study and these are discussed under the two main heads of irregular and ventricular complex. Each of these is again subdivided and the number of changes among the 47 patients are stated in percentages of the total for comparison. In the irregular complex group 4 or 8.5 per cent showed P waves of low voltage and 31.4 per cent (15) of high voltage or actual hypertrophy and 19 (47) had prolonged wave or more than 11 second QRS and other forms of wave a similarly considered of the ventricular complex 33 (70) had extrasystoles and other changes. All these are within well known limits in chronic

Chagas's disease between the normal and advanced myocardial disturbance, the most common being a "widened and irregular P, increased PR, QRS of the R B B B type and marked left axis deviation and fairly frequent polytopic ventricular extrasystoles" Those interested in more detail should consult the original

H Harold Scott

GOBLE, F C Chemotherapeutic Activity of certain 8-Aminoquinolines, particularly Pentaquine, in Experimental Chagas' Disease *J Parasitology* 1949, Aug, v 35, No 4, 375-8

Appreciable success in the treatment of *T cruzi* infections has so far been achieved only by compounds of the type of the quinaldine derivative Bayer 7602 (Ac) [MAZZA, COSSIO and ZUCCARDI, this *Bulletin*, 1937, v 34, 936], the trivalent arsenical Bayer 9736 (As) [MAZZA, BASSO and BASSO, *ibid*, 1943, v 40, 22], and certain phenanthridinium salts [BROWNING, CALVER, LECKIE and WALLS, *ibid*, 1946, v 43, 633]

It has now been found that certain antimalarial 8-aminoquinolines (the group to which pamaquin belongs) are active against *T cruzi* infections in mice For "screening tests" mice were infected by intraperitoneal inoculation of culture material, treatment being started four days later and consisting of intraperitoneal injections administered daily for five or six days For "evaluation tests" the duration of treatment varied in different experiments, and included both intraperitoneal and oral regimens Results were measured by the percentage of survivors and by the mean survival times Untreated controls usually died The compound which gave the best results among quite a small group of 8-aminoquinolines studied was pentaquine, a high percentage of cures being obtained whether treatment was by the intraperitoneal or the oral route

The author's opinion is that the potential usefulness of these pamaquin analogues in clinical practice is questionable in view of the known toxicity of the group as a whole

No action was discovered against *T congolense* or *T brucei* infections

E M Lourie

PELLOUX, A & DECOURT, P Essai d'application pratique du SNP dans la lutte contre la maladie de Chagas [Trials in the Practical Application of SNP (Thiophosphate o'diethyl o'paranitrophenyl) for the Prevention of Chagas's Disease] *Bull Soc Path Exot* 1949, v 42, Nos 3/4, 114-16

The houses, treated in this experiment with SNP either as an emulsion or as a dust, were of wooden construction and gave ideal refuge to domestic parasites

Five rooms of one house were sprayed with a 1 per cent emulsion at the rate of 200 cc per sq metre Three rooms of another house were thoroughly dusted with 0.25 per cent "Rhodiatox" powder giving a deposit of 10 gm of powder per sq metre One room and a poultry house were treated with 0.5 per cent powder

SNP used either as an emulsion or as a powder killed *Triatoma*, *Argas persicus*, *Ornithodoros tolidos* and *Lyponyssus bursa*

The authors suggest that the dust is more effective where the house construction is poor and there are irregular planks and crevices, since the powder penetrates the interstices and remains effective for a long period An emulsion, on the other hand, is rapidly absorbed by the wood

C M Harrison

SEN GUPTA, P. C. Treatment of Kala-Azar with Hydroxystilhamidine. *Lancet*, 1949 Jan 16 97-9 *69. 10 refs.]

Six cases of kala azar were treated by hydroxystilhamidine (4,4-diaminodimethyl-2-hydroxystilbene di-β-hydroxyethanesulphonate). This drug, synthesized by Dr A. J. ENI, several years ago had been found to compare favourably with stilbamidine in its *in vitro* and *in vivo* (in animals) action on *Leishmania* (this *Bull.* 1945 v 42, 19 1948 v 43 1128).

The patients were all Indians aged 10 to 45 and the diagnosis in each case was confirmed by the finding of *Leishmania*. Five had received no previous treatment. The drug was given only intramuscularly in four cases, only intravenously in one and by both routes in one. For the former route a 10 per cent. solution was used and for the latter the drug was dissolved in 2.5 ml. of 25 per cent. glucose and given very slowly.

The intention was to give two courses of 10 injections each on consecutive days with an interval of 7 to 10 days between courses amounting to a total of 3 gm. per 100 lb. body weight of patient but this course was modified in half the cases on account of severe local reactions. The average total was 2.7 gm. per 100 lb. body weight. The maximum individual dose given was 3.3 gm. per kgm. Smaller doses were given at first to test tolerance.

There were no untoward symptoms other than local inflammation at the site of the intramuscular injections. All six patients were apparently cured.

The usual clinical criteria of cure were observed during or at the conclusion of the course of treatment, namely: cessation of fever, improvement in general health and gain in weight, shrinkage of the spleen, pronounced improvement in the leucocyte count and a rise in the haemoglobin level in every case.

The six patients were followed up for 3, 3, 4, 7, 7 and 7 months respectively after the completion of the treatment and were found to be free from symptoms of kala azar. L. I. Vajpayee

CORRADETTI, A. Studi sulla epidemiologia della leishmaniosi cutanea della regione del medio Adriatico. II. Osservazioni sulla biologia del *Phlebotomus perniciosus* con. Studies on the Epidemiology of Cutaneous Leishmaniasis in the Adriatic Coast of Italy. II. Observations on the Biology of *P. perniciosus*. *Riv. di Parassit.* Rome 1949 June v 10 No. 2 111-16. English summary (* lines).

In a part of the Abruzzi all houses (rural and urban) have been treated with DDT at 2 gm. per square metre of wall and ceiling. *Phlebotomus perniciosus* generally became very rare. They seldom bit man indoors though they occasionally did so in the open.

In areas not treated with DDT these insects attacked man in the open as in such numbers as have perhaps not been recorded elsewhere in the world. They could always be found abundantly in stables and houses. P. A. H. I. M.

ORTIZ I & PARRA L. E. Presentación de un caso de *Leishmania truncataria* multiple con lesiones lepromatoides. Multiple Cutaneous Leishmanial Lesions resembling Leprosy. *Rev. de La Asoc. Méd. de Los Andes*. Caracas 1949 June v 15 No. 2 70-73. 4 refs.

The condition presented was illustrated by photographs. The patient showed numerous small nodules on ears, nose, arms, shoulders, flat along the chest, but there was no open lesion. By scarification or by staining lymph after speepering with I crystals as when examining for *M. lepro* the other found *Leishman Donovan* types in large numbers. In short it was a case of generalized cutaneous leishmaniasis. H. H. de C.

FEVERS OF THE TYPHUS GROUP

FONSECA, F & WOHLWILL, Fr *Tifus exantemático*

This book is reviewed on p 1195

PETRIE, P W R *Epidemic Typhus in Southwestern Arabia* *Amer J Trop Med* 1949, July, v 29, No 4, 501-26, 9 figs

The author gives a somewhat discursive description of his experiences in an effort to control louse-borne typhus which he found occurring in epidemic form during the years 1939-43, in the hilly region of the Yemen in South-West Arabia, near the Aden Protectorate

From references contained in the paper it appears that the places affected were at altitudes of 4,000 feet and upwards. In the capital, San'a the average mean shade temperature during the three months, October to December, is said to be 57°F as compared with 75°F during the same period in Aden

There must have been ample opportunities for the introduction of infection into the low-lying torrid areas of South Arabia, but neither typhus nor louse-borne relapsing fever appears to have become established in any of the coastal zones of the country

John W D Megaw

KRYNSKI, S *Investigations of Strains of Proteus X Type cultivated from the Organs of White Mice and House-Mice infected intranasally with Rickettsia prowazeki, the Causative Organism of Typhus Fever* *Bull Inst Marine & Trop Med, Med Acad, Gdansk, Poland* 1948, v 1, No 1, 29-32

The author has carried out a series of serological and biological investigations, "still incomplete", into strains, believed to be of *Proteus X* which were isolated from the organs of mice inoculated intranasally with *Rickettsia prowazeki*

Such strains were never found in healthy mice and the conclusion reached is that the occurrence of the strains is "explainable by a dissociation of *R. prowazeki* which in mouse organisms passes into a non-virulent form of *Proteus X*"

John W D Megaw

PHILIP, C B, TRAUB, R & SMADEL, J E *Chloramphenicol (Chloromycetin) in the Chemoprophylaxis of Scrub Typhus (Tsutsugamushi Disease) I Epidemiological Observations on Hyperendemic Areas of Scrub Typhus in Malaya* *Amer J Hyg* 1949, July, v 50 No 1, 63-74 [20 refs]

This paper consists of a detailed description of the epidemiological conditions prevailing in three areas near Kuala Lumpur in which scrub typhus occurred in hyperendemic form

Area I was part of a rubber plantation in which the mature trees had been cut down by the Japanese in 1943 and the ground had become overgrown with weeds and shrubs. In the work of clearance 37 out of a gang of 80 Tamil workers were attacked by scrub typhus between December, 1947 and July, 1948

Area II had been primary jungle which was cleared by the Japanese for growing food crops, but had later become overgrown with grasses. Among 17 persons engaged in cutting grass in the area ten were attacked by scrub typhus

Area III consisted of abandoned vegetable gardens which had become overgrown with *alang* grass. Nearly 100 Japanese internees were attacked by scrub typhus while engaged in cutting grass in late 1946

In none of the above areas had scrub typhus been known to occur before the Japanese invasion

There was suggestive, though not conclusive, evidence that relapses occurred more frequently among the patients whose treatment was started early

Eight of the volunteers had been inoculated with the British (Karp) type of vaccine prepared in 1945, and two had received relatively fresh vaccine of the American type, there was no evidence that either vaccine had any protective value, and it is stated that the American vaccine has recently been shown to be useless in Japan

The only suggestion of toxicity of chloromycetin was the occurrence of a moderate degree of insomnia in some cases after 4.0 gm doses. One patient said that he had felt the same degree of euphoria after a 4.0 gm dose as after a dose of 2.5 mgm of benzedrine

The authors discuss the similarity of the prophylactic effect of chloromycetin to that of mepacrine in *vivax* malaria *John W D Megaw*

HILDICK-SMITH G Tick-Bite Fever Report of a Case treated with Aureomycin.
South African Med J 1949, Aug, 20, v 23, No 34, 702-3, 1 fig

Tick-bite fever, caused by a rickettsial organism, is common in Southern Africa and may have serious complications

The author reports, with clinical details, a case of tick bite fever in a European male of 36. The case was clinically characteristic and was confirmed serologically

It was decided to administer aureomycin and this was given orally firstly in dosage of 250 mgm. at intervals of one hour for three doses, so that a high tissue concentration of the drug could be obtained. The dose was then repeated five times at intervals of two hours, after which the temperature became normal. The interval was then increased to four, six and finally eight hours. Therapy was stopped after a total of 4 gm had been given

The patient became afebrile in 14 hours, free from symptoms in 24 hours and was normal in 72 hours

The author points to the need for more studies of cases of tick bite fever so that the optimum dose and intervals may be determined. He refers to the two cases treated by GEAR and HARRINGTON [this *Bulletin*, 1949, v 46, 1025]
H J O'D Burke-Gaffney

ROSENKRANZ, G Queensland Fever in Israel Harefuah Jerusalem 1949
Aug 15, v 37, No 4 [In Hebrew 37-41, 5 figs (12 refs) English summary 41]

Q fever has already been detected in Israel [this *Bulletin*, 1949, v 46, 1026]. The present authors saw increasing numbers of cases of epidemic primary atypical pneumonia, without atelectasis in most cases, and with no cold agglutination

As Q fever was suspected, specific complement fixation tests were made and in 40 cases, titres of 1/32 to 1/2,054 were found. In some the titre rose fourfold during the disease. There were 220 patients in all of whom only 20 were in-patients

The clinical, radiological and other features are described. All but two cases examined radiologically showed lung involvement usually in the lower lobes

The temperature remained raised for five to 30 days (one case in the latter instance) with an average of ten to 12 days. Bradycardia was usually present. The only complication noted was orchitis, which occurred in one patient on the tenth day. There were no deaths directly attributable to the disease.

H J O'D Burke-Gaffney

ARMOUR A. & GILDMAN L. Isolation of the Causative Agent of Q Fever
C. burnetii in Israel. *Harefuah* Jerusalem, 1949, Aug. 15 37 No. 4.
 [In H. (rev. 41-3 English summary 43.)]

In connection with the outbreak of Q fever in Israel referred to, the authors succeeded in transferring the disease from the blood of a human case to guinea-pigs and isolating *C. burnetii* from these animals in egg inoculation. This organism was passaged and recovered successfully in other guinea-pigs.

The incubation period in guinea-pigs after the first inoculation of human blood was eight days; the incubation period was shortened during five serial passages. In guinea-pigs a rise of temperature was the only manifestation of the disease.

So far seven serial passages have been made in eggs. In the first the embryos died in seven to ten days, but after the third passage they died in five to six days. From the third passage onwards numerous exfoliations were found in areas of the yolk sac.

Guinea-pigs infected with an emulsion of yolk sac developed a severe and fatal form of the disease with many sick tissues in areas from the internal organs.

H. J. O'D. Burke-Gaffan

LEVETTE E. H. CLARK W. H. & DEAY H. H. Sheep and Goats in the
 Epidemiology of Q Fever in Northern California. *Am. J. Trop. Med.*
 1949 July v. 23 No. 4 527-41 2 figs. 22 ref.]

The first detection of the occurrence of Q fever in North California was made by a serological survey in March 1948. It appeared that cattle did not play an important part in the epidemiology of the disease, but that goat and sheep were specially concerned.

In one district with 200,000 cattle and 824,000 sheep there were 150 proved cases of the disease between March and October 1949. In 20 per cent. of the cases there was close contact exclusively with sheep and goat, and in 50 per cent. contact was only with cattle.

Cattle were encountered in only five of the 18 sites in which human cases occurred. In the remaining sites sheep or goats were the only animal with which the patients had been in contact. Complement fixation tests were carried out on 707 cattle of the affected area, and only 8 per cent. gave positive reactions, whereas 37.9 per cent. of the sheep and 43.6 per cent. of the goats reacted.

Sera from slaughter houses gave positive reactions in 7.1 per cent. of cattle and in 3.5 per cent. of sheep; these animals had not been specially worried with the occurrence of human attacks and the findings were regarded as being the low prevalence of infection in the region as a whole.

In the course of a limited survey the most striking results were obtained from five sheep belonging to a ranch in which 80.9 per cent. of the sheep were serologically positive. From one of the sheep with a complement fixation titre of 1-312 Coombs (Killett or *C. burnetii* var. 1) dated from the milk. The organism was also isolated from a pooled sample of the milk of 10 goats of the same ranch in which 3.4 per cent. of the goats gave positive reactions.

The mode of transmission is not known; swallowing infected milk and inhalation of infected dust are possibilities; transmission by tick must be exceedingly rare.

Reference is made to the investigation carried out by Coombs et al. who isolated the organism from the milk of sheep and goats in California. See this Bulletin 1949 v. 23 No. 2.

YELLOW FEVER

KOMP, W H W A Note on Disease-bearing Mosquitoes breeding in Bromeliads
Mosquito News 1949, June, v 9, No 2, 72

On several occasions Komp has collected larvae and pupae of *Haemagogus argyromeris* from water in the leaf-bases of a terrestrial Bromeliad, *Bromelia pinguin*, and once in an arboreal Bromeliad (*Gravisia* sp.), in the Panama Canal Zone. Other species of *Haemagogus* transmit yellow fever in jungle country, but they have hitherto been found breeding only in tree-holes, bamboo, etc. The new finding may have an importance in relation to the spread of yellow fever. Moreover, certain unidentified Sabethines were found breeding in terrestrial Bromeliads, and female adult *Haemagogus urialeti* were captured which could only have bred in them.

In a note on the same page F C BISHOPP reports the first outbreak of yellow fever in Panama since 1905. This occurred at the end of 1948, and there were five fatal cases near Pacora. The outbreak was terminated by prompt and widespread immunization.

Charles Wilcocks

RABIES

ORTIZ MARIOTTE, C Rabia humana en Mexico [Rabies in Man in Mexico]
Medicina Mexico 1949, July 10, v 29, No 583, 255-61

The date when rabies was first found in Mexico is not known, but an Anti-Rabies Institute was inaugurated in 1888. During the next 40 years the classical Pasteur method was used, but since then Semple's method or some modification of it. A table shows the numbers of deaths from rabies in each of 32 districts for each of the 10 years 1938 to 1947, the total was 410, the lowest, 23, in 1940, the highest, 66, in 1946, and the average 40. The sex was noted in 362 dying in the period 1938-1946, and 235 (64.9 per cent) were males, 127 (35.1) were females, although a population census shows a preponderance of females. The ages of those dying are given, 18 were under one year, 16 between 1 and 4 years, 62 between 5 and 9 years, 42 between 10 and 14 years, 19 between 15 and 19 years, and then in successive decades 97, 72 and 35, the age of one was not known. It is stated that "23% of the deaths were not medically certified", but that the histories in these were reliable. More detailed figures are given for the years 1945 to 1948. Of 66 deaths (said to be 30 per cent of all deaths registered during this period as due to rabies) 37 were males, 29 were females, bites were on the lower extremities in 25, on the head in 16, on the upper limb in 13, 17 of those dying were in the third decade, 11 were in the sixth decade. In 25, treatment by vaccine was started within 48 hours of infliction of the bite, in 3 it was later than this, in 8 the vaccination was "irregular and interrupted", and 30 received no specific treatment. During the period 1945 to 1947 altogether 4,008 persons received vaccine treatment and it is estimated that at least 83 per cent of those bitten by animals certainly rabid escaped death from the disease. Nearly all those bitten received some treatment on the spot, either direct cauterization, application of corrosives, disinfectants, or suction of the wound. The interval between infliction of the bite and starting the vaccine treatment is given for the period 1945-47 in percentage figures: less than 1 day 19.2, 1 to 4 days 60.72, 5 to 7 days 23.6, that is, more than 86 per cent received the treatment within a week. By far the most bites are inflicted by dogs, 3,867, as compared with cats which come next with 62, rats are third (stated as 27.3). The question of immunization of dogs is to be studied.

H Harold Scott

HAUTE ET J. CON. LANTIER, A. & TOME, A. Recherches expérimentales sur la rage. (Experimental Studies in Rabies.) Arch. Roumaine Path. Expt. et Microbiol. 1946 v. 13 No. 1-2, 133 pp. (37 refs.)

HORMAN ET AL. & COX, H. R. Studies on Chick Embryos adapted Rabies Virus. I. Culture Characteristics and Pathogenicity. J. Immunology. 1946 Dec. v. 60 No. 4 533-51 1 fig. (21 refs.)

The authors have adapted four rabies strains (Flury, NY, Zillwood and Dixon) to the chick embryo. They found seven-day-old embryonated eggs to be optimal and the best time for harvesting to be between the ninth and eleventh day after infection. Infections titre seemed to depend somewhat on incubation temperature.

Another experimental series dealt with the virus distribution in eggs. Titres proved to be nearly identical in the central nervous system, the body and the chorio-allantoic membrane, slightly lower in the yolk sac and very much lower in the allantoic and amniotic fluids if harvested on the seventh day. Titres in these fluids when harvested on the eleventh day were however almost as high as elsewhere. From this distribution the conclusion is reached that the virus must be not neurotropic as was proved for mammals but haemato-genic. Other work by the same authors now under publication on the infectivity of the blood from the chick embryo confirms this view.

A further experimental series was designed to answer the question: what influence if any, has the amount of original inoculation on the final titre. Inocula $10^{1.0}$ cc. (dilutions 10^1 to 10^8) gave equally good results. The same volume of 10^4 dilution of the original embryo suspension (containing approximately 20 M.I.U.) gave a poor yield. These findings are of much interest because of the fact that they do not confirm those of Henle in respect of the influenza virus which with almost dilutions as inoculum gave the optimal results.

The pathology of rabies infection of the chick embryo has been tentatively considered. The weight of infected embryos was found to be about 1/20th of that of normal embryos and seemed to depend directly on the amount of the original inoculum.

Eggs when infected with the very dilute virus were also found to be infected on the seventh day, never later but they died usually prior to hatching. Some 14 days after infection an outcome affected neither by the route of the inoculation route (intracerebral, yolk sac or amniotic). When the virus was carried out later however there was a latent time of 10-12 days before an increased proportionality. The latent death with the very dilute virus took place 7 days after hatching. Later deaths preceded by paralysis were virus-free.

The virus was used for serological studies. Neutralising titres were found regularly from the 1st day on. Latent time and titre were in the same order up to the 15th day. The question as to whether or not such was due to latent infection with rabies thus arose. The following results showed the virus only up to a maximum of 1st day. Heretofore.

The last of the experimental sections in the paper under review dealt with the determination of changes in virulence for the bird virus. Several series of pieces of adapting the virus to the chick embryo. But it first of all involved inoculation with the Flury strain followed by a latent period of 7 to 20 days after which they frequently succumbed within the first week. Several series and were all dead in 1-3 hours. Peripheral inoculation gave no positive results in rabbits. However, highly susceptible mice were used regularly when inoculated with material up to the 15th day. First of all

Flury strain, later passage material tended to leave survivors that were but temporarily paralysed. Hamsters were invariably killed by the 30th passage level of the NYC strain. Guinea-pigs appeared to be more refractory to peripheral infection with egg-adapted strains, inasmuch as the incubation period was extended up to 10 to 14 days and death occurred in 15 to 19 days after infection. In guinea-pigs there was no case of spontaneous recovery. *G Stuart*

JONNESCO, D & STAMATESCO, Silvia. L'action antibiotique de culture du bacille mésentérique sur le virus rabique fixe [The Antibiotic Action of *Bacillus mesentericus* on Rabies Fixed Virus] *Arch Roumaines Path Expér et Microbiol* 1948, v 15, Nos 1/2 302-4

The idea for the experimental work described in this article came from the observation that wounds from rabid animals which heal quickly give rise to the disease in a higher proportion of cases than do wounds which suppurate for a prolonged period. Culture media filtrates from staphylococci and streptococci, as well as from *P. pyocyaneus*, failed to reveal any power of neutralizing rabies virus, but with *B. mesentericus* the authors consider a virucidal action to have been established. [The conclusions are based on the use of only one animal per experiment. The culture fluid (stated to be a simple beef extract) would not appear to have been tested for possible virucidal properties. The titre of the inoculation virus was not determined.] *G Stuart*

BUSSARD, A, BEQUIGNON, R & LAMY, R. Contribution à l'étude de la rage III. De la présence de hyaluronidase dans la bave de chien normal [Contribution to the Study of Rabies III. On the Presence of Hyaluronidase in the Saliva of the Normal Dog] *Ann Inst Pasteur Hygiène* 1949, Aug, v 77, No 2, 183-5 [Summary appears also in *Bulletin of Hygiene*]

Articles I and II of this series have been previously reviewed [this *Bulletin*, 1949, v 46, 728]. In the present paper the authors describe a series of tests carried out with a view to proving that the saliva of normal dogs contains hyaluronidase. To this end they employed the measurement of viscosity reduction of a purified ammonium hyaluronate solution with a Couette type viscosimeter. Comparative tests with the Ostwald type provided similar results. Conventionally one V R unit was equal to 20 minutes.

The dogs were injected with 0.05 gm pilocarpine, of 14 tested as above only two dogs showed no hyaluronidase in their saliva, the rest showed up to 154 units per cc. Boiling for more than five minutes completely destroyed the enzymatic action, while storage at +5°C for two months led to a great reduction of activity.

From these results the authors conclude that the hyaluronidase content of the saliva enhances the virulence of the rabies virus and enables it to traverse the connective tissue and reach the nerve endings. *G Stuart*

VITTORIO VANNI, D. Nuevo método de coloración de los corpusculos de Negri [A New Method for Staining Negri Bodies] *Semana Méd* 1949, Aug 11, v 56, No 32, 263-5, 1 fig

The new method is a modification of that of Neri (1909). Neri's original method consisted of fixing the tissue in acetone and embedding in paraffin, sections were stained for ten minutes in 1 per cent eosin containing 0.1 gm of iodine and 0.2 gm of potassium iodide, after washing in water the section was stained with 0.1 per cent methylene blue for five minutes, then decolorized

to a lilac colour with 85 per cent alcohol. The Negri bodies stain a red colour, the cytoplasm blue with nucleoli dark blue but the results were inconsistent because of the decolorization by alcohol which takes place quickly.

The author modifies this in the following way. The fixative used is some form of osmotic sublimat. Lepane Zenker formal-sublimat etc. The tissue is then stained in double strength Lugol's iodine (iodine 1 gm. potassium iodide 2 gm. distilled water 100 cc.) and 1 per cent eosin mixed in equal parts immediately before use the stain being allowed to act for 30-45 minutes then washed in distilled water and stained with 0.5 per thousand methyl (not methylene) blue for three to five minutes for counterstaining washed, dehydrated and mounted as usual.

The Negri bodies take on a brilliant ruby-red the nerve and glia cells a cobalt blue. Methylene blue is a basic stain and will not colour decomposed cells or those which have undergone chromatolysis for it is the turned body which takes the methylene blue. methyl blue is an acid stain and so stains decomposed or chromatolyzed cells. The Negri bodies are easily distinguished from the red corpuscles (they are not by the original Negri method) because the latter take on a brick red colour in contrast with the ruby-red of the Negri bodies.

H. Harold Scott

PART C 1 & 2. JERVIS H. F. Rabies Vaccine Encephalomyelitis in relation to the Incidence of Animal Rabies in Los Angeles. Amer J P H 53 1949 July & 39 No 7 875-7

The authors report on nine cases (one fatal) of neuro-paralytic accidents which followed antirabies treatment with a Semple type vaccine (20 per cent rabbit brain either extracted, plasma-inactivated) among 5,500 persons vaccinated in Los Angeles during the seven years period 1940-46. Such an incidence of 1 in 600 is among the highest recorded. 1/4 (or 1 in 600) HORRICK 1 in 1,200 the Bulletin 1931 28 25 1834 39 731

Other interesting figures given are in respect of 3,180 persons between 1912-47 bitten by dogs proved to have been rabid at the time of wounding. Of that number eight died of rabies in spite of vaccination and 14 died without having been vaccinated.

As reckoned from these statistics the chances are 1 among 180 bites reported to be from a rabid animal and from 1 in 1,400 to 1 in 100 that a bitten person contracts rabies.

Animal passage experiments from all fatal cases of neuro-paralytic accidents were as is to be expected consistently negative. But as the previous allergic history of the patients are not provided. Emphasis is laid on the danger of the vaccine in the absence of a vaccine free from paralytic provoking factors. It is especially considering in each case whether or not and how much vaccine should be administered.

JERVIS G. A., HORNBERG R. L. & JERVIS H. Demystifying Encephalomyelitis in the Dog associated with Antirabies Vaccination. Amer J P H 53 1949 July & 39 No 1 14-21 8 Apr. 4th rels.

The purpose of this article was to report four cases of neuro-paralytic illness in dogs after antirabies vaccination. In their accidental attempt to produce neuro-paralytic accidents in these animals the authors administered to each of a group of 100 dogs (50 of the St. Bernard and 50 of the Great Pyrenees breeds) which had previously been immunized by the LaSalle-Dunkin method against distemper over a period of 100 cc of a 20 per cent horse brain emulsion with 0.5 per cent plasma antirabies vaccine. In 10 of 100 dogs a therapeutic

four dogs—all of the Great Pyrenees breed—developed paralytic symptoms. Of these, three were sacrificed when moribund and one, which had shown signs of partial paralysis on the 20th day after vaccination, survived, but still had, three months later, a residual paralysis, spastic in type, of the hind leg

A detailed pathological examination was carried out on two of the dogs and nine photomicrographs (eight figs) are published. Perivascular infiltration with lymphocytic and histiocytic elements, demyelination and gliosis were the main changes observed. Attempts to isolate the infectious agent by means of repeated subinoculations failed, and it is of interest to note that in no instance, on complement-fixation testing with rabbit and dog brain as antigen, were anti-brain antibodies demonstrated. Thus although the virus origin of the condition was experimentally excluded, its possible allergic nature could also not be proved, inasmuch as anti-brain antibodies, such as have been detected in the guinea pig, were not found.

Demyelinating encephalomyelitis giving similar histological lesions may occur spontaneously in the dog and has been observed in the nervous form of canine distemper. Very interesting parallels to human encephalopathies are drawn, viz, the spontaneously occurring type—acute multiple sclerosis, the post-vaccinal type—following vaccination and anti-rabies treatment, and the post-infectious type—following measles or mumps. G Stuart

SABBAN, M S EL. Cultivation of Pseudorabies Virus in the Yolk Sac of the Developing Chick Embryo. *Proc Soc Exper Biol & Med* 1949, July, v 71, No 3, 423-9, 4 figs

In this paper the growth of the pseudorabies virus (Aujeszky) on the yolk sac membrane of the chicken egg has been studied. Seven-day-old embryonated eggs used in the investigation were harvested immediately after death, which took place at first on the third day and at later passage levels in 40 hours. The yolk sac membrane was found regularly to provide an infectious titre of 10^6 , while the embryonic tissue and the chorio-allantoic membrane and fluid gave a titre one log lower except at first egg passage, when they titred only 10^3 . During adaptation of the virus to the chick embryo mortality rose gradually from 60 per cent at the first passage to 80 per cent after the fifth passage and to 100 per cent from the twelfth passage on.

After the fiftieth egg passage, the virus failed to produce any skin lesions in the subcutaneously-infected rabbit, but, as commonly happens after intracerebral inoculation, paralytic symptoms made their appearance.

A detailed description of the pathology of the disease in chick embryos is given. Macroscopically, haemorrhages occurred, at the higher passage levels, over the entire skin surface. Microscopically, congestion and leucocytic infiltration of the brain, together with all stages of degeneration of central nervous tissue, were found. Mesothelial cells of the brain as well as the yolk sac membrane showed acidophilic intranuclear inclusions which were at first only in the form of granules but in later passages solid.

For the identification of the virus, a neutralization test with antiserum of known activity against rabbit-brain passage virus was employed." G Stuart

PLAGUE

CHEN, T H. The Behavior of *Pasteurella pestis* in Glycerin and Rhamnose Mediums. *J Infect Dis* 1949, July-Aug, v 85, No 1, 97-100 [24 refs]

In a study of 53 strains of *Pasteurella pestis* from the collection in the University of California the author found that three were "glycerin positive", producing acid in culture media containing glycerol.

From an analytical survey of the literature it is concluded that the glycerol-positive and glycerol-negative strains seldom occur together in the same region.

All but one of the many strains hitherto recorded from Manchuria, Mongolia, South-East Russia, Turkestan, and South Russia have been glycerol-positive, whereas nearly all the strains from other parts of the world have been glycerol-negative.

The author admits that further studies are needed before the preponderance of this distribution can be gauged. He also mentions that some workers have found that glycerol-positive strains have become glycerol-negative after long storage or after subcultivation.

J. A. H. D. Meyer

PAZDROKOWSKI, T. Rats from the Ports of Gdynia and Gdansk (Poland).
Bull. U. S. Marine & Trop. Med., Med. Acad. Gdansk, Po. 1, 1949, v. 1
No. 1, 13-16.

In a survey of 874 rats from the port of Gdynia and 786 from the port of Gdansk, it was found that nearly 90 per cent were *Rattus norvegicus* and the rest were *R. albus*.

Among 92 rats taken on ships in the harbours only five were *R. norvegicus*. These surveys were made up to October 1, 1947.

In the port of Gdynia a previous survey made in 1934 gave quite different results: 50.6 per cent of the rats were *R. norvegicus* and 49.4 were *R. albus*.

The explanation of the difference is believed to be the wartime cessation of seaborne traffic and the resulting interruption of the influx of *R. albus* from ships.

J. A. H. D. Meyer

LIVA, V. H. Plague among Wild Rodents in Rio Arriba County, New Mexico.
Amer. J. Trop. Med., 1949, July, No. 4, 473-477, 1 fig.

The author describes a thorough investigation made over two years, May and August 1949, into the presence of plague infection in Rio Arriba County in New Mexico, on the Colorado border.

The County is 5,871 square miles in area, the population is 23,336. In 1940 no evidence of infection was found among 470 animals from 25 different areas of the County. In 1943 there were many deaths among the wild animals of one area, and since that time practically all the animals have been reported from one time and disappearing temporarily or permanently from all other areas, presumably as the result of plague infection.

In the present study 371 rodents belonging to 20 species and 72 other animals were trapped or shot. Thelastosporeidites were collected and examined.

The only animal found infected was the prairie dog (*Citellus pygmaeus*), of which 94 were examined. Plague infection was stated from 15 of 14 fleas collected from 11 of the animals and from the tissues of five others.

From 12 marmots (*Marmota flaviventris*) only two strains of bacteria were isolated. One of the strains was from a pool of blood collected from a dead animal; the other was from a pool of blood collected from a living animal. From the latter group 1 animal (8 fleas) and 6 ticks were isolated but were found free from infection.

No cases of human plague have been known to occur in this area. The only human infection reported was a small fever of the form of dengue.

John H. D. Meyer

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

GELIN, G Retentissement cardio-vasculaire de l'amibiase chronique A propos de 80 observations recueillies en un an en Oranie [Cardio-vascular Complications in Chronic Amoebiasis 80 Cases collected in Oran in a Year] *Bull et Mém Soc Méd Hôpit de Paris* 1949 Nos 21/22, 788-94

HERNÁNDEZ VARGAS, C R Nuevo tratamiento de la amibiase intestinal [A New Treatment of Intestinal Amoebiasis] *Rev Facul de Med Bogota* 1949, Mar, v 17, No 9, 415-55 [16 refs]

The "new treatment" here described is, in essence, a combination of drugs which have been tried singly with varying success. The author has divided his account into five chapters of which the first gives some data on the prevalence of infection by *Entamoeba histolytica* in Columbia between 1916 and 1943, and the second consists of remarks on ipecacuanha, emetine, E B I, arsenicals such as treparsol and stovarsol, and on yatren, vioform and diodoquin, culled from the literature and containing nothing new. Chapter III explains the rationale of the suggested treatment—the simultaneous administration of emetine, penicillin and sulphaguanidine. Originally, by what is called the Hargreaves method, in 1944, emetine hydrochloride was injected in a daily dose of 0.06 gm for seven days, then 0.4 gm till "the total in centigrammes was equivalent to the patient's weight in kilogrammes". If a second course was needed 45 days were allowed to elapse after the first. At the same time as the emetine there were injected 200,000 units of penicillin every day, divided into eight doses, at intervals of three hours for one week, and sulphaguanidine was given, 4 gm four times a day (16 gm daily) for a week, totalling 112 gm.

In 1947 this method was modified and the course consisted of three phases: i. Of six days during which there were given daily injections of 0.06 gm emetine, together with one million units of penicillin in doses of 33,000 units every three hours and 20 gm of sulphaguanidine or sulphamethazine, 1 gm every four hours. ii. Of 12 days, emetine bismuth iodide 0.12 gm (2 grains) every night and a retention enema of 4-6 oz of chiniofon, 1-4 per cent daily. iii. Of 20 days, diodoquin 0.63 gm three times a day. The patient may be up and about during the third phase, but in hospital for the first two. The author has slightly modified this procedure as follows. Days 1 to 6 emetine hydrochloride, 0.06 gm daily, preceded by injection of some cardiac tonic such as sparteine, penicillin, 33,000 units every three hours to a total of 1,000,000 units, and sulphadiazine 1 gm every four hours to a total of 20 gm. Days 7 to 18 Daily retention enema of 4 oz of chiniofon, 2-4 per cent, after a wash out with 2 per cent sodium bicarbonate, bismuth subnitrate in capsules containing 0.5-1 gm, three a day. Days 19 to 36 Five tablets of diodoquin daily, two in the morning, one at mid-day and two at night, each containing 210 mgm.

The advantages claimed for this procedure are that the dose of emetine is reduced to a minimum compatible with efficiency and toxic symptoms are avoided, the associated drugs act on the intestinal bacterial flora, the iodides act on the cystic forms of the entamoeba and the bismuth counteracts the possible diarrhoeic action of the chiniofon.

Twenty cases are detailed, 16 males, four females, whose ages ranged between 17 and 60 years. Generally, symptoms showed improvement in six days. Sixteen patients were cured, in four there was no benefit, at least no lasting benefit, but two of these suffered also from tuberculosis and two had a heavy infestation with hookworm.

H Harold Scott

abandoned in the United States in favour of the former. There are many cases of chronic amoebiasis among US war veterans, some of whom have been subjected to unsuccessful treatment, others of whom have not. This fact and the general dissatisfaction with, and lack of agreement on, the current therapy of amoebiasis have encouraged the authors to search for a more effective amoebicide than any so far available.

The thioarsenite C C 906 (p-carbamidophenyl arsenous acid) (or carbarsone oxide) was the most effective amoebicide against *E. histolytica* discovered by laboratory test, although more than ten times as active as carbarsone (p-carbamidophenyl arsenic acid) it proved much more toxic, probably because the valence of the arsenic was three rather than five. Substitution of -SH groups for oxygen reduces the toxicity of arsenicals, and two such derivatives of carbarsone oxide, C C 914 (p-carbamidophenyl-bis (carboxymethylmercapto) arsine) and C C 1037 (p-carbamidophenyl-bis (2-carboxyphenylmercapto) arsine), proved less toxic to the tissues in amoebiasis of monkeys while largely retaining their amoebicidal activity *in vitro* and *in vivo*. These two compounds were subjected to clinical trial, in Tennessee and in Costa Rica, on 100 patients suffering from a variety of protozoal and helminthic infections. Of 82 patients (77 infected with *E. histolytica*, two with *Dientamoeba fragilis*, and two with *Balanidium coli*), treated with one or other of these compounds, 74 were freed of their parasites, as judged by 6-12 stool examinations during the ensuing four months. Another 18 patients (two infected with *D. fragilis*, 12 with *Strongyloides stercoralis*, one with *Fasciola hepatica*, two with *Leishmania tropica*, and three with *Treponema pertenue*) were similarly treated but without benefit. The dosages employed ranged from 3.0 gm orally in ten days to 7.2 gm in 24 days, the smaller dosage was just as effective as the larger, 13 patients with acute dysentery were given 3.0 to 6.0 gm of C C 1037 in six days in retention enema. No toxic side-effects were observed other than nausea and vomiting in 12 cases, coating the pills with phenyl salicylate obviated this. The authors conclude that these two thioarsenites are therapeutically effective amoebicides in doses 1/10 to 1/5 that of carbarsone, and they can safely be given orally thrice daily for ten days in enteric-coated tablets containing 25 to 50 mgm of the drug, in severe cases of dysentery they may be given as retention enema.

A R D Adams

DE LA GARZA BRITO, A & TREVIÑO VILLASEÑOR, A. Nota preliminar sobre la acción terapéutica de un nuevo amebicida. [Preliminary Note on a New Amoebicide] *Medicina Mexico* 1949, July 10, v 29, No 583, 261-9.

[The question immediately arises to anyone reading this article, "When does a drug cease to be new?"] The drug referred to here is Win 1011, the amoebicidal action of which was proved by HAUER in 1943 [see this *Bulletin*, 1943, v 40, 913, where it is called "Wja" throughout]. The name was given because the drug is a product of the Winthrop-Sterling Institute, Mexico. It contains approximately 37 per cent of bismuth and 15.7 per cent of pentavalent arsenic, and is put up in tablets of 0.25 gm. The authors give details of ten patients treated, one was given six tablets daily for ten days, one had four, but all the others received five daily for the ten days. Tolerance was generally good, there might be complaint of headache and a little colic or nausea, but not enough to cut short the treatment. At the end of the course, and often after four days or so only, no *Entamoeba histolytica* could be seen in the stools and proctoscopic examination was also negative.

H Harold Scott

LUIS CARRI, E. Equivalente epileptiforme por giardiasis intestinal. [Epileptiform Manifestations in Giardiasis] *Archivos Sec. Salud Pública de la Nación* Buenos Aires 1948, June, v 3, No 19, 57-60.

WHEELER I. V. & LACOURT J. Artamibosia A la Glándula tiro J. N. Chile 1949 Aug. v. 78 No. 2, 257-9 4 figs.

A child 24 months of age with kerat emulacia of both eyes was demonstrated to have a *Clonorchis* infection. He had a at the time of 1st chronic anemia and low vitamin A content in the bile. The curves for both vitamin A absorption and desaturation showed exceptionally poor absorption of these materials.

After the parasite had been eradicated, the absorption of both vitamin A and carotene became normal, the excess fat disappeared from the feces, the patient gained much weight and his anemia greatly improved."

ALLEN M. & BAKER G. *Coccidiosis humana de Intestino* (Review) in *Archivos de Medicina*. Coincident Infestation by *Isospora belli* and *Isospora belli*. *Archivos de Medicina* 1949 Sept. v. 10 No. 3, 143-5. 1 fig. 1 table. English summary (4 lines).

A woman of 74 years, employed with her husband in gardening, complained of vague abdominal pain and disturbance with weakness and diarrhea. She, her husband and five children all were harbouring hookworms and the patient herself was infected also with *Isospora belli* and *Trichuris trichiura*. A definite causal connection could not be made on account of an interperalade pykotic system. Treatment by thymol reduced both infestations. This was followed by chloroform and eucalyptus oil in castor oil, but the first dose of this caused great general disturbance so no more was given, but improvement was rapid and examination of the stool showed no more parasites. A strange fact is recorded but not explained, the Wawermann reaction tested after the first bowel from the chloroform and eucalyptus oil was strongly positive. When the third was cleared the test was again carried out but this time was completely negative.

Dr. Harold A. C.

LEPROSY

VALLE C. O novo social leprosy. Leprosy in its Social Aspect. *Revista de Medicina* Rio de Janeiro, 1949 June. 6 No. 6, 400-1.

This article is of the nature of a general talk on leprosy in Brazil, the ignorance of the masses concerning the disease, factors which influence its spread, in short, the epidemiology of leprosy in general terms. Of secret facts and speculations based on them are at the end of the paper. It is stated that according to official returns there are 70 leprosy institutions in Brazil, these include leproseries, colonies, a storm hospital, a leprosy and contain 31,823 patients. In addition to these there are many isolated their homes and others, a large one provincial parishes which would bring the total to about 90,000, this would allow only 77 for each of the 11 groups. The average number infected by each taken arbitrarily, there so that there may be said to be 63,000, but it need not be taken in the 11 or 81,000 infected or latent or potentially infective. Taking the total population as 43 millions this would give 1 in 630. As to the members of the family and social contacts in close touch are supposed to be 31 x each or a total 147,000 and these together with the 63,000 above mean that more than 500,000 persons must be considered when the problem of leprosy prophylaxis comes under discussion.

Dr. Harold A. C.

Leprosy

Vol 46, No 12]

BECHELLI, L M & ROTBERG, A Idade e lepra estudo dos fatores exposição e resistência [Age and Leprosy, a Study of the Factors of Exposure and Resistance] *Rev Brasileira Leprologia* S Paulo 1949, Mar, v 17, No 1, 31-44, 2 figs [56 refs] English summary

If we were to judge from statements in medical literature, say the authors, we would infer that childhood and early adolescence are the ages when leprosy is most often contracted, and this is explained [so far as it can be called explanation and not mere tautology] by saying that the young and immature body is more susceptible to infection. From a study of records from Hawaii, New Caledonia and Nauru Islands, and of the indigenous and immigrant population of São Paulo, they infer that the incidence, or rather the prevalence, depends not so much on age as on the degree of exposure to infection. Thus, in the islands mentioned, children and adults are about equally exposed, in São Paulo, among the indigenous population the incidence in descending order was the 4th, 3rd, 5th, 6th, 2nd, 7th and 1st decades, among the relative age [immigrants] 5th, 6th, 7th, 4th, 3rd, 2nd and 1st.

For purposes of comparison the authors show by graphs the relative age incidence of measles and conclude that "depending on an earlier or a later age of exposure and on the resistance of the individuals in contact with infectious foci, a higher incidence of the disease among children or adults will be observed"

H Harold Scott

DE FARIA, J L Valor do metodo de Faraco para coloração do bacilo de Hansen em cortes [Value of Faraco's Method for the Staining of the Hansen Bacillus in Paraffin Sections] *Rev Brasileira Leprologia* S Paulo 1949, Mar, v 17, No 1, 18-26, 2 figs on 1 pl [13 refs] English summary

Faraco's method of staining Hansen's bacillus has been regarded by some as a modification of the Ziehl-Neelsen procedure, but this is not a correct view. The principle consists in treating the section, before staining with fuchsin, with some fatty or oily substance—liquid paraffin, cod-liver oil, Singer's alcohol and xylol. The method is as follows —

Fix the tissue in 10 per cent formalin, then pass in the usual way to embedding in paraffin. Cut sections 4-6 μ in thickness, remove the paraffin with xylol and then pass through alcohols to water. Deposit Merck's liquid paraffin on the section and heat till steam rises, allow to cool, blot with filter paper till the section becomes opaque, stain with hot acid fuchsin, as by the Ziehl-Neelsen method, wash in water, then in liquid soap, pure or a little diluted; wash well in water and pass rapidly through alcohol 70 per cent, wash again in water, differentiate in 25 per cent sulphuric acid till the section is a light red on washing in water, wash in running water for at least 10 minutes, stain lightly with methylene blue so that the section appears a reddish-blue, not a pure blue, then pass through alcohol and xylol and mount in neutral balsam.

Tissue from 36 patients whose lesions showed very few bacilli were stained by the Ziehl-Neelsen and by the Faraco techniques, 10 were positive by the former, but 14 by the latter, and when organisms were seen by both the numbers were much greater by the Faraco technique. The author found also that organisms present in old lesions might have lost much of their acid-fastness and so be recognizable only with difficulty by the Ziehl-Neelsen technique, whereas this property seemed to be restored by the Faraco method.

H Harold Scott

DE SOUZA ARACIO, H. C. Estudo bacteriológico de excetos de leprosin tuberculosos em tratamento com a estreptomycina com êxito das culturas obtidas. Bacteriological Study of Sputa of Tuberculous Leprosy Patients treated with Streptomycin. *Hefila*. Rio de Janeiro 1949. Mai v 73 No. 5 755-6.

In 1941 the author recorded the results of examination of the sputa of patient suspected of being also tuberculous and obtained positive culture in nearly one in three. In the next two years he obtained an even higher proportion (43 per cent.) In the Curupaty Colony many advanced cases also tuberculous were treated with streptomycin. Sputa of some of these were cultivated on Löwenstein-Jensen medium and 11 out of 11 gave a growth after 15 days; the specimen had been kept for a week in an ice-chest and it was to be noted that this delay might have affected the growth, so fresh specimens were asked for and cultured at once. In 15 to 20 days 11 had given a growth and so had not more of the first lot. The remaining negative of the first lot continued negative. Other specimens 14 in all were cultured and 13 gave characteristic growths of *Mycobacterium tuberculosis* of the rugose type. Streptomycin had no effect on the pulmonary organisms of these patients. Three of the patients giving a growth of *Mycobacterium tuberculosis* gave also growths of chromogenic acid-alcohol fast organisms such as the author has already obtained from leprosy patients. These are to be specially studied and will be reported upon later.

H. Harold Scott

BLUMENFELD, F. (Estudo do comportamento da alergia tuberculosa em doentes de leprosin após a cura. Alergia Response to BCG by the Children of Leprosy Patients.) *Rev. Brasileira de Leprosia*. S. Paulo 1949. Mar v 17 No. 1 27-30.

The author tested 164 children of leprosy patients ranging in age up to 14 years by the Mantoux test using OT 1:100, 1:100 and 1:10 regarding as negative those failing to respond to the last dilution. 70 (42.6 per cent.) proved positive 94 negative. The M. tuberculosis test was made with injection of 0.1 cc. of leprosin and the result read 71-90 days later. 81 per cent. reacted among those tuberculin positive and 87.9 per cent. those tuberculin-negative.

Eighty-four of the tuberculin-negative were given a single dose per os of 20 cgm. of BCG and a month later 82 of them were tested by the Mantoux test 1:100 and, if negative, 1:10. 11 (13.3 per cent.) were positive. When 78 of them were tested again a year later only 77 (25.5 per cent.) were positive 49 being negative.

By way of comparison 173 of the inmates of an orphanage whose ages ranged between 4 and 17 years, were similarly tested with tuberculin. 103 (59.5 per cent.) were positive, the other 70 were given BCG and 43 of these were tested for allergy to tuberculin one month and again in one year afterwards. 70.7 and 71.3 per cent. respectively were positive.

The author concludes that the children of leprosy subjects M. tuberculosis react to tuberculin in about the same proportion as a control group of non-leprosy persons, that is there is no group sensitization due to the presence of *Mycobacterium leprosy*. Further allergy can arise from BCG in children already sensitized to *Mycobacterium leprosy* is more transient than that found in the general population (as evidenced by the orphanage children). In fact allergy to leprosin presumably set up far from favoring allergy to tuberculin, it causes in the body a certain anergic action evidenced when one tests the tuberculin allergy of milk-intoxicated such as that produced by BCG.

H. Harold Scott

DE AQUINO, U M Observação e discussão de um caso de lepra tuberculoide Mitsuda-negativo, reação focal despertada pela tuberculina [Observation and Discussion of a Case of Tuberculoïd Leprosy, Mitsuda-negative, Reaction brought out by Tuberculin] *Hospital* Rio de Janeiro 1949, May, v 35, No 5, 745-53, 2 figs [14 refs]

A Brazilian white man, 25 years of age, who gave no family history of leprosy but who had married a woman with the clinically diagnosed lepromatous form of the disease, presented himself with a 5-months' history of symptoms when examined, he showed maculo-erythematous, hypochromic and achromic patches with clear edges but covering fairly large areas on the trunk and limbs, and anaesthesia to heat and pain over the areas supplied by the cubital, popliteal and peroneal nerves, the hands were amyotrophic (*main-en-griffe*)

Bacteriologically, the nasal mucosa and skin from various sites were negative, the early Fernandez and the late Mitsuda reactions were both negative. An intradermal Mantoux reaction was then tested with tuberculin 1:10,000 and in 24 hours there was a local infiltration 25 mm in diameter and a general reaction in all the leprides, especially marked in those of the forehead, and there was systemic disturbance, in 48 hours the local erythematous infiltration had reached 30 mm, after this the general disturbance began to improve, the local reaction was disappearing after 4 days, but the "lesion reactions" have persisted "up to the present" [interval not stated] *H Harold Scott*

ZAVALLIA, A U Ação das diamino-difenil-sulfonas sobre as complicações oculares da lepra [Action of Promin on the Eye Lesions of Leprosy] *Rev Brasileira Leprologia* S Paulo 1949, Mar, v 17, No 1, 5-17

Much useful information may be gained even from negative results of an experiment. In view of the favourable reports on the use of Promin in leprosy the author has tested this compound in 25 leprosy patients, whom he divided into 4 groups. Each patient received 100 intravenous injections over a period of 4 months, the injection was given daily, except on Sundays, the first dose being 5 cc or 2 gm of the drug, and the subsequent doses 12.5 cc (5 gm), with a 30 days' rest after the course.

Group I, 5 patients, suffering from the lepromatous form in an early stage, or the indeterminate type, but without any ocular lesions. Each patient received about 1,200 gm (stated as $1,184 \pm 285$) during a period of 14 months or so, average 14.20 ± 2.49 months. In none of them did any eye complications occur, one improved clinically, but not in any other way, i.e., bacteriologically no change could be detected. Group II, 7 patients, with moderately advanced lepromatous stage (L_2) and slight ocular lesions, some infiltration of the cornea and thickening of the circum-corneal nerves. These received $1,207 \pm 267.5$ gm of Promin over a period of 13.86 ± 3.08 months. Three showed a distinct improvement in the eye condition, disappearance of thickening of the nerve-ring and partial resorption of the infiltration, in two there was no change and in the other two a nodular iritis and extension of the lesion to the anterior part of the uvea. Group III, 5 patients, in a more advanced stage of L_2 and more severe eye lesions with nodular iritis. They received $1,160 \pm 147.1$ gm of Promin during a period of 11.80 ± 2.86 months. Of these, in one the condition remained stationary, in the others the military nodules increased in number and, in short, they became worse. Group IV, 8 patients, with a more advanced lepromatous form (L_3), and more severe eye complications, keratitis, nodules in the iris and diffuse irido-cyclitis. The ranges of dose here seem to have been greater, for the author states that they received an average dose of only 934 ± 317.2 gm, because the degrees of tolerance were so varied, and the

average duration of treatment was 17 ± 4.04 months. In 6 of the 8 the ocular lesions became definitely worse the nodules increased and the iridocyclitis extended. In one the condition remained unchanged and in one only was improvement observed both in the interstitial keratitis and the acute iridocyclitis present. It can only conclude therefore that Proton will not arrest or delay the development of the slow and progressing ocular lesions of leprosy.

H. Harold Scott

GUADAGUAYO M. LA cirugía en la lepra. [Surgery in Leprosy] *Archivos Soc. Salud Pública de la V. n. Nuevo Alcaz. 1945, Aug. 4* No. 2, 139-51. 11 refs. (17 ref.)

GUADAGUAYO M. A. El tratamiento quirúrgico de las neuritis hipertroóficas de la lepra. [Surgical Treatment of Hypertrophic Neuritis in Leprosy] *Archivos Soc. Salud Pública de la V. n. Nuevo Alcaz. 1947 Feb. 1* No. 3, 4, 13, 7 figs. 10 refs.

Enlargement of certain nerves notably the cubital, the external popliteal and the median is commonly observed in leprosy. In this enlargement there are three stages of evolution. The first, in which the acuteness of the pain leads to the limb being kept semiflexed and as immobile as possible because movement increases the pain. In addition to the pain there is hyperaesthesia with tortication, weakness and slowness of muscular movement. The second in which the pain is on the whole less intense and less persistent, but occurs in exacerbations and signs of wasting of muscles appear. In the third, the atrophy is marked, with functional incapacity, but no pain.

Surgical intervention is useful in the first two stages, not in the third. Operation consists in freeing the swollen nerve from its sheath and the fibrous epineurium and endoneurium. The stages are well shown in a series of photographs. The results are reported of 77 patients thus treated. In 7 the pain was completely relieved, in 30 the nerve function improved, in 20 there was no change in this respect. Of 54 in whom the cubital nerve was thus dealt with 21 obtained improved function with disappearance of the pain, 24 lost their pain but functionally there was no change, in 5 the pain returned. Of 10 with external popliteal involvement 7 had no more pain and the limb improved, in the other 3 function was unaffected although the pain disappeared. Four had median nerve involvement, all lost their pain, but in two only did the function improve, it remained unaffected in the other two.

H. Harold Scott

HELMINTHIASIS

LOUGHEIX E. H. & SPRUE N. H. Diagnosis of Helminthiasis. *J. Amer. Med. Ass. 1949 Apr. 9* 140 No. 15, 107-100. Refs. in footnotes.

Stoll estimates that there are 700 million tapeworm, 149 million hookworm and 2,000 million roundworm infections in the world this month, 1947, or 44.6%. A not insignificant percentage of these is encountered in the United States and Canada. Since the return of immigration a number of foreign species have been introduced into these countries. Of 15 now from the Pacific area were infected with tapeworms, hookworms and many had schistosomiasis.

For examination of faeces the authors describe a concrete box method (CEM). To 40 ml. of faeces add 4 ml. of 10% indigo carmine laboratory alcohol (flocyt) and 10 ml. of 10% formalin. Mix and allow to stand.

and kept overnight, and shaken again. 1.5 ml is now placed in a 15 ml pointed centrifuge tube, to which 3.5 ml isotonic saline, 5 ml ether and 2 drops of xylene are added. This is shaken well and centrifuged at 2,000 revolutions per minute for 1½ minutes. The debris is wiped away and the supernatant fluid poured off. One or two drops of saline are added to the deposit which is placed on a slide by means of a pipette and examined. The whole sediment represents 0.1 gramme of faeces.

The authors propose a "diagnostic plan" which consists of a careful geographical history, naked-eye inspection of faeces passed without a cathartic, followed by a direct watery smear of a selected portion, a CEX concentration as described above, a cellulose tape and smear for *Enterobius*, charcoal culture of the stool, proctoscopy, and rectal biopsy.

In discussing the differential diagnosis they emphasize that each worm infection may mimic many serious organic maladies. They issue a warning, however, that the finding of an helminthic infection does not exclude co-existing organic disease.

L E Napier

MARILL, F G, HOFMAN, M & BERTOZZI, P. Le foyer de bilharziose urinaire de Fondouk (Algérie) [The Focus of Urinary Schistosomiasis in Fondouk (Algeria)] *Arch Inst Pasteur d'Algérie* 1949, June, v 27, No 2, 110-27, 1 map & 8 figs on 4 pls.

The first focus of *Schistosoma haematobium* infection in Algeria was found in 1939 [this *Bulletin*, 1940, v 37, 150, 483], the existence of a second at Fondouk has now come to light. This evidence of spread of the range of the parasite in Algeria is the more significant now that extensive irrigation schemes are being undertaken. The water courses, reservoirs and irrigation distribution, and the climatic and geological conditions in the Fondouk area are described in detail.

Investigation has revealed 67 cases of urinary bilharziasis in Fondouk, two of the sufferers were Europeans, the rest Mussulmans, all were males ranging in age from 8 to 50 years, the highest incidence of infection being in the younger patients. All the patients were infected by bathing in the river Hamiz, which has been dammed to form an irrigation reservoir, and it would appear that the infestations date from the summer of 1946. Specimens of *Physa acuta*, *Bulinus contortus* [truncatus], and *Planorbis metidjensis* have been found in the area.

The possibilities for spread of the infection obviously are great, and measures are suggested to limit it.

[This paper should be consulted in the original by those interested.]

A R D Adams

MEESER, C V, ROSS, W F & BLAIR, D M. Further Observations on the Macroscopic Diagnosis of Urinary Schistosomiasis. *J Trop Med & Hyg* 1948, Mar, v 51, No 3, 54-9, 3 figs.

In this paper the authors describe in detail their reconstruction and use of the miracidiascope with its optical arrangement, originally designed by GORMAN and the present authors [this *Bulletin*, 1948, v 45, 258]. They discuss its use in the diagnosis of urinary schistosomiasis.

The miracidiascope consists of a specially constructed wooden rack painted dull black to hold centrifuge tubes and a hand lens 1 in in diameter and of 2½ in focal length, to view the miracidia swimming about in water.

The value of the instrument is two-fold.

(1) The procedure is relatively simple and an opinion as to the presence of the disease can be given in an outstation clinic or during a routine school inspection without costly apparatus or specialized training.

a membrane was formed around those cercariae which had been placed in immune serum, but was absent from those immersed in control serum, a phenomenon referred to by the authors as the "*Cercarienhiillen Reaktion*" or CHR test. The subject was reinvestigated in 1947, and it is with the results then obtained that the present paper is concerned. The technique of carrying out the CHR test is very simple—it essentially consists in mixing together on a slide a drop of the serum to be tested and a drop of water containing a concentration of living cercariae, usually 30–50. The reaction was shown to be non-specific, but it was found that *S. mansoni* cercariae tended to give the strongest reaction when tested against the sera of mammalian hosts, regardless of whether these were infected with *S. japonicum*, *S. haematobium* or *S. mansoni*.

A well-marked +++ positive reaction is characterized by the appearance, within 1–2 minutes of immersion, of a narrow, clear zone, which is in reality a homogeneous membrane, surrounding the cercariae. This membrane rapidly increases in distinctness and depth, to 3μ or wider, while the previously smooth edge becomes contoured. In less well-marked (++ and +) reactions, the time taken for the reaction to develop is longer and the membrane produced is thinner and less distinct in outline. Having recorded by this means the reactions given by the sera obtained from a large number of infected animals—monkeys, dogs, cats, mice and rabbits—and from a few human infections, the authors repeated the observations using various dilutions of the serum, and ascertained the highest dilution, the end point, at which the reaction was observable. The combined results of these two investigations are given as follows. A strong +++ positive reaction is characterized by the formation of a membrane not less than 3μ in depth, and the highest dilution of serum in which a reaction can be noted is 1/80 to 1/160. A moderate ++ positive reaction is characterized by the production of a membrane 2– 3μ in depth, and an end-point in the serum dilution of 1/40. Distinct but less well-marked reactions are classed as weak (+) positive reactions. A drop of dried blood may be substituted for the serum; this technique sometimes gave results similar to those obtained with the serum, but on some occasions the result was negative when the serum reaction was positive, and for this reason the method was abandoned as unsatisfactory. It was observed that inactivated serum gave the same results as normal serum, and that cercariae killed by heating to 56°C gave a positive reaction, whereas those heated to 100°C did not do so.

With the use of the CHR technique already described a large series of infected and uninfected animals was examined. The results obtained are recorded in the paper in detail, but they may be summarized by saying that with the exception of mice, all animals infected with any one of the three species of human schistosomes and found negative before infection, gave a positive reaction at an early stage after the infection was established. On the other hand, among 3 monkeys, 7 dogs, 13 rabbits and 20 mice found free from all forms of trematode infections, one rabbit and one dog gave a positive CHR reaction.

As regards human infections, the sera of seven patients excreting Schistosome eggs, or having excreted them one to five months previously, all gave a positive CHR. The sera of five patients, who had previously been infected but who for the past five years had been symptomless and were no longer excreting eggs, were negative. A control test carried out on 157 residents of Hamburg in whom the possibility of schistosome infection could be dismissed gave no positive results except in one instance where the serum gave a feeble positive reaction on the first examination and was negative on subsequent examinations [This case is omitted from the authors' summary].

(7) It can be employed in the determination of viability of ova. There are certain microscopic criteria of viability but this macroscopic method may be used in addition for the purpose.

Many useful practical points in the preparation of specimens are discussed these should be read in the original.

The terminal portion of the urine vessel is collected and allowed to stand for approximately 30 minutes after which the upper part is decanted, leaving sufficient behind to fill a centrifuge tube. This is centrifuged at low speed and the liquid gently drained off. Five ml. of water (either filtered and boiled pond or rain water) are added to the deposit. The tube is then inserted in one of the holes provided in the rack. Hatching is usually complete within 30 minutes but may be delayed up to 40 minutes. If viable ova are present in the urinary specimen these hatch and the miracidia can be seen through the lens swimming around actively in the water.

The authors conducted comparative trials with the microdissection and the already established microscopic technique. Of 173 specimens of urine examined, 294 (23 per cent) were positive for ova microscopically and 243 (14 per cent) by the microdissection. In 11 (16 per cent) the infection was recognized by both methods. Diagnosis was established on miracidial hatching alone but not microscopically in 35 cases whereas in 84 it was made microscopically but no miracidia were seen to hatch. In 33 of these 84 cases the ova were non-viable. The paper is illustrated by two photographs and one figure of the microdissection. *H. Garland*

GUHBERT R. Die Struktur der Körperoberfläche von *Filicaria murina* (Lamborn 1907) (Structure of the Body-Covering of "murina") *Zisch f. Tropenmed u. Parasit.* Stuttgart 1949 v. 1 N. 1 105-114 4 figs.

Looms a classical work on the anatomy of *Filicaria harnaldi* was published in 1915. It was not until 1937 however that a distinction between *F. harnaldi* (Loom) and *F. murina* was recognized and there appears to be little doubt that Loom's description of the body-covering in the genus *Filicaria* was founded on a study of material containing a mixture of both these species. The author of the present paper has had the opportunity of studying material obtained from mice infected with *F. murina* and killed after treatment with "Nirvan" (He makes no reference to the possibility that the drug may have altered the normal appearance of the worms). The observations recorded are confined to this species and the results obtained from the investigation have confirmed and amplified Loom's findings particularly as regard the thick layer of the pores on the overlapping edges of the proscaphites and as that this structure remains closed without muscular effort on the part of the male.

The author's observations are limited to the main part of the cuticulously carinated and vacuolated integument as unpaired, ciliated diagrammatic drawings of the morphology and anatomical distribution of the various types of pores occur on the body-covering of both sexes of *F. murina*. *R. M. Gordon*

VOGLT H. & MEYER C. W. Hüllbildung bei *Filicaria* (Loom) im Serum *Filicaria-infizierter Tiere und deren Membran-Formierung in Schistosoma Cercariae placed in Serum of Animals and Man infected with Schistosomes.* *Zent. f. Bakt. Abt. I Orig.* 1949 143 91 105 4 figs. 17 ref.

In 1940 the author investigated the survival time of *Filicaria murina* cercariae placed in serum obtained from immune and non-immune animals and believed that

complexity of the present system has resulted in part at any rate from too little attention having been paid to the constantly changing morphology which accompanies growth in molluscs, and which is further influenced by food supply and environment, he points out that these difficulties do not beset the entomologist who is concerned with creatures which, for the main part, undergo but little change after they have reached the adult stage. The author might well have added that the entomologist bases his classification on the complete specimen whereas the malacologist is often asked to base his classification on the shell only. AUBOTT (this *Bulletin*, 1948, v. 45, 1096).

During recent years the author has made a special study of the *Platiorbidae* of the Belgian Congo, not only has he studied the collections of other workers in various parts of the world but he has carried out extensive surveys in the field and has maintained and bred many species of the schistosomiasis vectors under artificial conditions. As a result of these studies, and with the approval and co-operation of Dr. J. Bequaert, he suggests a simplified classification and considers that the *Platiorbinae* of the Belgian Congo should be classified and named as follows:—

- 1 *Biomphalaria alexandrina* var *pfeifferi* (Krüss 1948)
- 2 *Biomphalaria alexandrina* var *tan-ganyensis* (F. A. Smith 1881)
- 3 *Biomphalaria alexandrina* var *stansleyi* (E. A. Smith 1888)
- 4 *Biomphalaria alexandrina* var *clau-on-phala* (von Martens 1879)

For doctor, veterinary surgeons and others who are not familiar with the terminology of the malacologist the classification can be simplified and modified as follows:—

- 1 *Pf. pleifferi* shell of moderate size, more or less globulose and without a keel. Occurs in streams, ponds and marshes.
- 2 *Pf. tanagericensis* large flat shells without a keel. Occurs in Lake Tanagerivaka.
- 3 *Pf. starleyi* shell of moderate size, globulose, with a keel on one side only. Occurs in Lakes Kivu, Edward and Albert.
- 4 *Pf. chevronophilus* shells higher than *Pf. starleyi*, with a prominent keel on both surfaces. Occurs in the same three lakes as 3.

The reason for this classification which the author admits may err on the side of over-simplification are set out fully in the text and should be consulted in the original by those who are interested. R. M. Gordon

Summary: 1. Note préliminaire sur le rôle de la bion par les notes et variétés des Plurales en plus resp de l'Afrique éthiopienne dans la transmission de *Schistosoma* (P. Harwood) intestinales. Preliminary Note on the Role of All Varieties of *Plurales* in the Belgian Congo in the Transmission of *Schistosoma* (P. Harwood) intestinales. Ann. Soc. Bel. et Méd. Trop. 1949 Mar 31. 29 No 1: 67-71.

[illegible]

The authors present evidence to prove that the membrane formed around the cercaria is not derived from any outpouring of fluid from the cephalic gland, the latter resulting in a granular mass, sometimes visible inside the clear membrane characteristic of the CHR reaction. They cannot state how the membrane originates, but they postulate that it arises from certain constituents occurring in the serum of animals infected with schistosomes coming into contact with fluid diffusing through the cuticle of the cercariae. The authors were at first of the opinion that the membrane they described might affect the ability of the cercariae to develop in the final host, and that it might be responsible for the immunity to superinfection which was observed in a proportion of the animals giving the reaction. Further observations and experiments, which are fully described, have caused them to alter this opinion, and they now consider that the membrane is in no way responsible for acquired immunity in schistosomes. A inference has already been made to the fact that the CHR reaction cannot be used to distinguish the species of a histosome involved, and the authors carried out a further series of experiments to try to determine it more clearly. No reaction was obtained with the sera of animals and persons infected with various species of tapeworm, nor with the sera of two rats infected with *Opisthorchis schistosomus*. On the other hand the sera of cattle infected with *Fasciola hepatica* gave a positive CHR when tested against schistosome cercariae. This lack of specificity is a disadvantage, but the authors consider that the results so far obtained by them suggest that the test might prove of value in diagnosing human infections, and urge that it should be investigated further.

The paper adds considerably to our knowledge of the serology of trematode infections and should stimulate further investigations along the lines suggested by the authors. R. M. Gordon

SCHWETZ, J. Sur une nouvelle classification des Plasmodes du Congo Belge (Resp. de l'Afrique éthiopienne. A New Classification of Plasmodia in the Belgian Congo.) Ann. Soc. Belg. de Méd. Trop. 1940 Mar 31 v. 20 No. 1 37-44 20 figs. no pl.

The author points out the impossibility of an entomologist studying the epidemiology of malaria or tripanosomiasis without a corresponding knowledge of their vectors and that similar knowledge of at least certain groups of molluscs is necessary when investigating the epidemiology of schistosomes. When the malariologist wishes to determine the species of any anopheline with which he is concerned, he follows the well recognized rules for identification which have been prepared by expert entomologists and is still in doubt, he can rely on the opinion of a recognized authority, while similar facilities are available to the research worker studying the tsetse in tripanosomiasis. Professor Schwetz points out that modern malacology, in contrast to the modestly included as himself, are in no such fortunate position, not only as the tables of classification neither clear-cut nor well recognized, but the experts may differ amongst themselves regarding the classification of a particular specimen or group of specimens. In support of this latter statement the author remarks that having encountered difficulty in making a differential diagnosis between certain specimens he wrote the opinion of two malacologists.

La difficulté de les identifier. Pl. le nom d'espèce et il est alors d'après l'auteur.

Professor Schwetz writes that it will become the custom in a particular science to criticize the specialist, but most workers will agree with him now that the present system of classification of snail vectors is much too artificial and that a look for a revised and simplified classification is considered as the solution.

winter, it migrates to the land, where it lives in small cavities between grass roots and stones. Unlike the other snail hosts of the schistosomes, *O. hupensis* does not breed throughout the year, but only during spring and early summer, in addition, its eggs are laid singly, not in masses, each egg being enclosed in a covering of fine mineral slime. This covering acts not only as a mechanical protection, but it also forms an efficient camouflage, hence, although it was certain that the eggs were being laid in the aquaria, for young snails were appearing regularly, it was only after two years of breeding in the aquaria that the eggs were discovered. It would appear that this fine mineral slime is derived from a clay occurring in the normal habitat and that it is essential for oviposition. Without such clay, the snails will not readily breed in artificial aquaria, and under natural conditions in China the snail disappears, as does schistosomiasis, when one changes from heavy clay ground to sand or gravel. The young snails hatch from the eggs within a fortnight and, under favourable conditions, they develop very rapidly, some becoming full-grown within three months of hatching. The length of life of *O. hupensis* was not observed, it is probably similar to that of *O. nosophora* which is stated to live for five years or possibly longer.

O. hupensis is easily infected with the miracidia of *S. japonicum*, the rates of infection in seven series of experiments lay between 23.6 and 80 per cent. It tolerates infection well, and it may continue to shed cercariae for as long as a year. An interesting observation recorded in this part of the work is that *O. hupensis* infected with a single miracidium did not supply fewer cercariae than did those which had been exposed to many cercariae, probably because the digestive gland of the snail only offers sufficient food for the development of a limited number of sporocysts. Dogs, usually sheep dogs, were found to be the most satisfactory final hosts and in order to ensure that both sexes are represented among the adult schistosomes developing in these animals it is advisable to use cercariae from a number of snails, eight to eleven is the number recommended.

This paper contains exact instructions, often illustrated with clear diagrams concerning the maintenance of *O. hupensis* and the methods for its infection and it will prove invaluable to anyone endeavouring to maintain a strain of *S. japonicum* under laboratory conditions.

R M Gordon

SÉDALLIAN, P, MARAL R & PERRIN A. Epidémie familiale de distomatose à 'Fasciola hepatica' [A Familial Epidemic of Distosomiasis due to *Fasciola hepatica*] *Bull et Mém Soc Méd Hôpit de Paris* 1949 Nos 9/10, 327-33.

The authors are encouraged to report this familial outbreak of distosomiasis due to *Fasciola hepatica* by the comparative rarity of human infection with this worm. The aetiology was classical in that the patients had been eating watercress from a field in which infected cattle were kept. Women and children only were affected. All were treated by glucantime (antimonate of N-methyl-glucamine), with good results, but no claim is made that this drug is better than other anthelmintics, many of which are effective on account of the weak hold that this infection has in man.

The five cases are reported in detail. The onset and symptomatology were very similar in all the cases. It was usually gradual with malaise, shivering, periodically fever, usually low, and a non-productive cough. In every case there was epigastric pain at the onset or later.

There was albumin, usually a trace only, in four of the five cases either before or after treatment had been started, the amount increased during

COSTA R. MEXERRE H & MAGALHES A Jr. Faqueirosidade causada e perniciosa. Lesões hepáticas de robôes infectados e subcutâneas a tratamento pelo tartarato de sódio e antimonita. (Experimental Schistosomiasis murina. Hepatic Lesions caused in Infected Calomys treated with Sodium Antimony Tartrate). *Rev. Brasileira Med. Rio de Janeiro* 1943 June v 6 No 6 378-83 1st fig. English summary

For their experiments the authors infected 20 (7-4) guinea pigs with cercariae of *S. murina*. 8 were given Citibetin (sodium antimony tartrate) orally muscularly in doses ranging between 0.08 and 0.7 mgm. per gm. body weight i.e. 5-20 8 mgm. average dose and totals of 45 to 75 mgm. Sixteen were given the drug intraperitoneally in physiological saline and some of them received a second course after an interval of 20 days. Four animals died after treatment the others were killed at different intervals and their livers were fixed in 10 per cent. formalin for histological examination. Five others were not fed but left untreated as controls and killed at intervals between 49 and 105 days after infection.

The tissue changes are described and depicted in a series of plates for the macroscopical changes and photomicrographs for the histological. It was found that the worms were killed by the drug and the presence of the dead worms gave rise to nodules accompanied in places by necrosis of the tissue. Within the vessels an embolus was set up which acted as a barrier to the penetration of the decaying nutrition products. If however the worm had broken through the vessel wall to the parenchyma of the organ it caused its tissue to necrose. The fibrosis resulting from the necrotic focus if it reached the surface of the liver would by contraction produce a granular appearance of the surface. This is well shown in two of the figures. // *Howe & Co.*

VOGLI H. Letztgenige Untersuchungen über die Wirkung von Infektionsversuchen mit *Rikettsia japonica*. Maintenance of the animal & prevention and Experimental Infection of it with *R. japonica*. Reprinted from *Ztschr. f. Parasitenk.* 1943 11 70-81 8 figs. 10 p.

For a laboratory investigation of any one of the three forms of self-inoculation occurring in man it is necessary to have continued breeding of the small host. In the case of *S. murina* the author has maintained a strain of *Anthraxus* guinea for more than sixteen years and a strain of *Calomys* for several years and has found that both these species are easy to infect and give a plentiful supply of cercariae to his small host infection in the final host. In the case of *S. haematophila* the author has maintained a strain of *PA. typhus* guinea originally imported from West Africa but although his experiment of the parasite has taken place in the past he has a personal difficulty in obtaining a strain of *S. haematophila* with the results of cercariae not coming out more than three worms in Europe he has had to maintain a particular strain of *S. haematophila* in the form of a small host. On the other hand the author has found no difficulty in maintaining *S. japonica* in the form of a small host. The author has a personal difficulty in obtaining a strain of *S. japonica* which he imported from Japan but he has found that the technique has been to find all breeding of the small host in past years difficult but Vogel has found that the workers have not been successful and in order to help them he describes a method for the maintenance of infecting the small host in the form of a small host.

(1) *Howe & Co.* what kind of animal is the small host? (2) *Howe & Co.* what kind of animal is the small host? (3) *Howe & Co.* what kind of animal is the small host?

winter, it migrates to the land, where it lives in small cavities between grass roots and stones. Unlike the other snail hosts of the schistosomes, *O. lupensis* does not breed throughout the year, but only during spring and early summer, in addition, its eggs are laid singly, not in masses, each egg being enclosed in a covering of fine mineral slime. This covering acts not only as a mechanical protection, but it also forms an efficient camouflage, hence, although it was certain that the eggs were being laid in the aquaria, for young snails were appearing regularly, it was only after two years of breeding in the aquaria that the eggs were discovered. It would appear that this fine mineral slime is derived from a clay occurring in the normal habitat and that it is essential for oviposition. Without such clay, the snails will not readily breed in artificial aquaria, and under natural conditions in China the snail disappears, as does schistosomiasis, when one changes from heavy clay ground to sand or gravel. The young snails hatch from the eggs within a fortnight and, under favourable conditions, they develop very rapidly, some becoming full-grown within three months of hatching. The length of life of *O. lupensis* was not observed, it is probably similar to that of *O. nosophora*, which is stated to live for five years or possibly longer.

O. lupensis is easily infected with the miracidia of *S. japonicum*, the rates of infection in seven series of experiments lay between 23.6 and 80 per cent. It tolerates infection well, and it may continue to shed cercariae for as long as a year. An interesting observation recorded in this part of the work is that *O. lupensis* infected with a single miracidium did not supply fewer cercariae than did those which had been exposed to many cercariae, probably because the digestive gland of the snail only offers sufficient food for the development of a limited number of sporocysts. Dogs, usually sheep dogs, were found to be the most satisfactory final hosts, and in order to ensure that both sexes are represented among the adult schistosomes developing in these animals, it is advisable to use cercariae from a number of snails, eight to eleven is the number recommended.

This paper contains exact instructions, often illustrated with clear diagrams, concerning the maintenance of *O. lupensis* and the methods for its infection, and it will prove invaluable to anyone endeavouring to maintain a strain of *S. japonicum* under laboratory conditions.

R M Gordon

SÉDALLIAN, P, MARAL, R & PERRIN A. Epidémie familiale de distomatose à "*Fasciola hepatica*" [A Familial Epidemic of Distosomiasis due to *Fasciola hepatica*] *Bull et Mém Soc Méd Hôpit de Paris* 1949, Nos 9/10, 327-33.

The authors are encouraged to report this familial outbreak of distosomiasis due to *Fasciola hepatica* by the comparative rarity of human infection with this worm. The aetiology was classical in that the patients had been eating watercress from a field in which infected cattle were kept. Women and children only were affected. All were treated by glucantime (antimonate of N-methyl-glucamine), with good results, but no claim is made that this drug is better than other anthelmintics many of which are effective on account of the weak hold that this infection has in man.

The five cases are reported in detail. The onset and symptomatology were very similar in all the cases, it was usually gradual with malaise, shivering, periodically fever, usually low, and a non-productive cough. In every case there was epigastric pain at the onset or later.

There was albumin, usually a trace only, in four of the five cases either before or after treatment had been started, the amount increased during

treatment in two cases. The blood showed a slight degree of anaemia—3.6, 3.9 and 4.4 millions of red cells per cmm. and an eosinophilia of 33, 1, 43 per cent except in the case of the elderly woman who died.

Ova of *Fasciola hepatica* were found in only two of the six, in one after treatment had been commenced, both in faeces and in bile obtained by duodenal intubation.

Treatment was by intramuscular injection of glaucantime daily for 10 days in doses of 4.5 grammes for the woman weighing 53 kg. and 3 grammes daily for ten days for the other children and the elderly woman, and 1.5 grammes for the child 1 eight years. There was usually a febrile reaction, in four cases there was a complete clinical cure but in one of these there was a complicating bacterial binary infection which was eventually cured by intravenous streptomycin after sulphonamides, penicillin and streptomycin had apparently failed. The fifth patient a woman of 68 died of anaemia after treatment she had previously damaged kidneys.

The authors believe that the albuminuria was due to the infection and that it was increased by the antimony preparation killing the parasites and causing an increase of circulatory toxin rather than by the direct effects of the drug itself since it never produces this effect in the treatment of brismaniasis.

The eosinophilia and the lung symptoms suggested Leffler's syndrome which has been shown to occur in distomiasis as well as in ascariasis.

L. E. Naper

HERNBERG, C. A. Roentgenological Visualization of the Fish Tapeworm, *Diphyllobothrium Latum*, in the Intestine of Man. A Preliminary Report. *Acta Med Scandinavica* 1949 Aug 15 v 135 No 2, 135-41 3 figs.

"Eight tapeworm carriers (*Diphyllobothrium Latum*) were roentgenologically examined after a barium contrast meal. In three cases parts of the worm could be visualized. In one case the roentgen picture showed the worm in the colon and in two cases in the ileum. In all the eight cases the peristalsis of the intestine was increased.

ARCHIVOS SOC. SALES PÉPULOS DE LA VALLE DE BUENOS AIRES 1949 May v 3, No 18 66-77. Realizase en Aral 1 Segundo Congreso Internacional de Hidatidosis. (Second International Congress on Hydatid Disease held at Aral, Buenos Aires.)

This article consists of notes of an international Congress held in May 1949 at Aral in Buenos Aires and devoted to the subject of hydatidosis. The account is itself an abstract and it is to be hoped that the Proceedings will be published in full in due course.

The Congress was opened by Dr. RICCALA DRO, the Minister of Health, and Dr. José M. JORGE was appointed President. At the first plenary session, Dr. F. rez FONTANA read a paper on the pathology of Hydatidosis of the Lung and Dr. ITURRIOTZ one on radiological interpretation. The second main feature for discussion was the surgery of Pulmonary Hydatidosis introduced by Dr. Iván Godó MORAN, and the treatment of the small and medium sized uncomplicated cysts and the large infected or hemorrhagic cysts for which resection is the only cure. Drs. M. SERRA and A. I. AGUIRRE spoke of Calceosol's biochemical method of injecting procaine down a hydatid antigen which is maintained throughout and suppresses all the symptoms and often actual cure.

The section of prophylaxis was in charge of Dr. Carlos HERNÁNDEZ who said that sheep were the most infected, and that the source of infection was pulmonary.

hydatid and that dogs are the most important vectors. Human beings are infested by the digestive route only. He refers to an instance where a dog ate infected meat and itself in time conveyed the disease to all the members of the family with which it lived.

At the second plenary session the main theme was the Biological Treatment of Hydatidosis, introduced by Dr IMAZ APPATHIE who also read a paper, conjointly with Dr LORENZ, on the Serodiagnosis of Hydatidosis. Several of the delegates spoke on Calcagnos biological treatment, in which there is used as antigen the hydatid fluid and triturated membrane in a series of progressive injections.

Resolutions were passed urging the authorities in the different States to class hydatidosis as an industrial disease. Matters proposed as major subjects for the next Congress were the biological treatment of the infestation and the surgery of *Echinococcus* infections of bones. H Harold Scott

BONNECARRERE, E. A. & ARDAO, R. La nefrectomia parcial en la hidatidosis renal [Partial Nephrectomy and Renal Hydatidosis] *Arch. Uruguavos de Med., Ciruj. y Especialidades* 1949, Feb., v 34, No 2, 221-30. 12 figs.

BATTELLI, C. Ricerche parassitologiche sui muridi di Asmara [Parasites of Rodents in Asmara] *Riv. di Parassit.* Rome 1949, Sept., v 10, No 3, 159-65. [16 refs.] English summary (4 lines).

Examining certain rodents in Asmara the author found the following parasites: *Entamoeba muris* (once), *Giardia muris*, *Diplocercomonas* (once), *Trypanosoma lewisi*, *Eimeria falciformis*, *Eimeria meschulzi* (once), *Bartonella muris*, *Anaplasma marginale*, *Hepatozoon muris*, *Sarcocystis muris*, *Cysticercus cellulosae* (once), *C. fasciolaris*, *Hymenolepis diminuta*, *H. nana* var. *fraterna* (once) and *Diphylllobothrium* larvae. Of these the only ones which might infect man are *Cysticercus cellulosae*, *Hymenolepis diminuta*, *H. nana* and the *Diphylllobothrium*. The value of the proportional findings is much reduced when we note that of the five species of rodent examined the total amounted only to 40, namely *R. rattus* 20, *Mus decumanus* and the white rat 6 each, and the house mouse and field mouse (*Arvicola*) 4 each. H Harold Scott

See also p 1105, FERREIRA, PINTO & DE ALMEIDA, Alguns dados sobre a biologia do *Anopheles gambiae* da cidade de Bissau e arredores (Guiné Portuguesa), em relação com a transmissão da malária e filariase linfática.

ANN. NEW YORK ACAD. SCI. 1948, May 25, v 50, Art 2, 19-170, 22 figs. [Numerous refs.] The Chemotherapy of Filariasis [ASHBURN, L. L. & others].

This symposium on the Chemotherapy of Filariasis was the result of a Conference held by the School of Biology of the New York Academy of Sciences on October 17th and 18th, 1947. Thirty-eight authors, many of them well known in this field of research, contributed 15 papers, covering all aspects of the subject, which will be welcomed by fellow-workers all over the world. The introductory paper by COGGESHALL describes the filarial organisms infecting man as belonging to the genera *Wuchereria*, *Onchocerca*, *Mansonella*, *Acanthocheilonema* and *Loa* and in addition the closely related filarial worm *Dracunculus medinensis*. The filarial parasites which occur in lower animals have played a large part in the experimental studies of this infection. The author briefly discusses the history of *W. bancrofti*, including its introduction to the United States. During the course of filarial infections, which tend to be chronic, no

marked immunity is produced and the possibilities of vaccine therapy appear to be limited. The major effort for protection has in the past been directed to the control of mosquito vectors. In spite of the high morbidity and infection the low mortality rate has made all but Public Health Authorities almost indifferent and the new sera proved that curative and effective chemotherapy remedies should prove of the greatest service in eliminating the infection.

In describing general experimental methods of studying filarial infection *Howzer* (who collaborates in two later papers) points out the importance attained in the cotton rat infected with the filarial worm *Leishmanoides*. In these investigations during recent years. Naturally infected animals were at first used but difficulties were encountered with this type of infection. Controlled infections in rats of known duration are now more fully employed in the chemotherapy studies. To a lesser extent dogs infected with *Dirofilaria immitis* have also been used in combination with microtechniques. Some correlation exists in the results obtained from studies in man, dogs, and cotton rat in spite of the different parasite genera involved. The promise of using the cotton rat has paid handsome dividends by providing a vehicle for the synthesis of new chemotherapeutic agents.

From their own experimental data and review of the literature *Ott* and *Mayer* conclude that trivalent arsenical are of value in the treatment of human and canine filariasis and that in this class of compounds the further substitution of phenylarsenoxides is warranted by results.

Brown outlines his investigations on the value of antihelmintic in filariasis. Dogs infected with *D. immitis* were first used in conjunction with radiographic techniques. Development of radiographic and exsanguine methods for the estimation of Schizonts possible to investigate the distribution of secretions of this substance in the body. In some patients intramuscular injection of antihelmintic produces a rapid and persistent diminution in the microfilariae of *H. bancrofti*. In dogs similar results were obtained but the action on the worm was not conclusively determined.

Van pointed out in *Cebu* reliable data in the results of chemotherapy treatment of filarial infection has only recently become available. This is now the first time that naturally infected with *Leishmanoides* as hosts for the evaluation of new filariocides. The chief effect was found to be against the adult worms. Human experiments were carried out in volunteers in Porto Rico in which infection with *H. bancrofti* was treated with trivalent pentavalent arsenical compounds with the inclusion of *As*. The author believes that the hazard of some drug treatments are greater than those of the infection and that safer drugs which preferentially can be administered by mouth as currently required. In his previous work *Van* was the best tolerated and most effective of the antihelmintic. There was no correlation between antihelmintic and blood microfilariae and *Van* believes that it is possible to eliminate infections of *H. bancrofti* by means of treatment with arsenical and antihelmintic.

Barber et al. describe their experience in Guatemalas on the 23 volunteers with onchocerciasis by hypodermic injection and the effect. Diagrams were made of skin nodules by swiping followed by examination in saline for microfilaria. Observations were made for the presence of adult worms and were continued for 6 to seven months after the treatment ended. The distribution of skin nodules was followed after administration of antihelmintic containing the alcohols. Outlets of the nodules. Microfilariae were not killed by the drugs and the damage to adult worms was probably slight.

The toxic effect of *As* given parenterally have long been recognized and their nature, frequency and frequency in 74 patients after intramuscular treatment with seven different antihelmintic are described in *How*. In each case the

reactions of varying severity were encountered. It was noted particularly in the case of neostibosan and to a lesser degree with neostam that a tolerance developed to the drug. In contrast to these results with pentavalent compounds, the opposite effect was produced by the trivalent substances Fouadin, anthiomalme and tartar emetic. In some cases urea stibamine produced severe reactions but stibanose was given without untoward effects. The author believes that melarsen oxide is a dangerous drug even in moderate doses.

Cyanine dyes have been found to show remarkable activity in filarial infections and their chemistry is briefly discussed by BROOKER. The chemotherapeutic activity of these substances and related compounds is then discussed by WRIGHT *et al*. The special cages and holders used to facilitate treatment of the cotton rats host are described. [In the reviewer's laboratory cotton rats, used for experimental studies on kala azar, are handled with great ease by a skilled technician without any special apparatus.] Animals were treated every eight hours and received 18 doses of drug. Variations in activity of these substances with alteration in constitution are outlined. The essential structure for activity of cyanines appeared to be a resonating system consisting of tertiary and quaternary nitrogen atoms separated by a carbon chain with an uneven number of carbon atoms and conjugated double bonds.

In a most interesting paper BUEIDING describes the effect of cyanine dyes on the metabolism of *L. carinii*. Both *in vitro* and *in vivo* these substances, in extremely low concentration, inhibit the oxidative metabolism of the parasite. Their curative effect appears to be exerted by this means. The action of cyanines is, moreover, highly specific since concentrations 500 to 1,000 times greater have no effect on the respiration of animal tissues or the activity of various cytochromes. The metabolism of *L. carinii* shows many differences from that of other parasites and would appear to be worthy of closer study.

In a short paper the antifilarial action, toxicology and clinical trials of certain cyanine dyes in human infections are described by PETERS. The cyanines had been selected after tests against *L. carinii* infections of cotton rats along with *in vitro* studies of the metabolism of the adult worm. Although active against cotton rat infections the results in man were disappointing.

KUSHNER *et al* discuss the chemistry of piperazine compounds in the chemotherapy of filariasis. They were interested in obtaining a non-metallic filaricide which could be given orally. As a result of screening experiments in cotton rats the activity of piperazines was discovered. The production of hetrazan (1-diethylcarbamyl-4-methylpiperazine) is a sufficient tribute to the value of these researches. HEWITT *et al* present data on the filaricidal properties of 126 of these compounds including Hetrazan, of which about 20 per cent were active against microfilariae in cotton rats infected with *L. carinii*. They caused an immediate reduction in the numbers of circulating microfilariae, and the adult worms were affected to some extent in the cotton rat and dog hosts. In contrast Sb compounds and cyanine dyes affect adult worms without reducing the microfilarial count. Oral dosage was as effective as parenteral. Later compounds of this type were found to be effective against *W. bancrofti*. Frequent dosage was necessary and toxicity was negligible. The low toxicity of hetrazan was confirmed by HARNED and co-workers who also found that few side reactions resulted from its use. The dosages tolerated by various laboratory animals are recorded. Excretion was found to be rapid by the kidney but the form in which the drug was eliminated has not been determined.

In the final paper of this symposium SANTIAGO-STEVENSON *et al* describe the results obtained by treating 26 Porto Rican patients harbouring the microfilariae of *W. bancrofti* with Hetrazan. All were in-patients and the drug was administered orally at intervals of eight hours in doses of 0.5 to 2 mgm per kilo of body weight over a period of three to 21 days. Although a few

untoward symptoms occurred they were not of a sufficiently serious character to cause discontinuation of treatment. There was a rapid reduction in the microfilarial count. At the end of 160 days after treatment 100 of 24 cases were still negative and in a large percentage of the remainder numbers of microfilariae were reduced. For best result a dose of "mga. per kilo three times daily for two to three weeks" suggested. There was some evidence that adult worms had also been affected.

J. D. Feltus

OTTO, G. F. & MARSH, T. H. Studies on the Chemotherapy of Filariasis. Part I. IV. *Am. J. Hyg.* 1940 July v 50 No. 1 62-141 3F-m. 49ref.

Part I of this series gives a general introduction to the search for effective filarialicidal drugs.

Part II describes the testing of compound 1 *in vitro* on the microfilariae of *Dirofilaria immitis* from the dog. One part of infected blood was mixed with four parts of 0.5 per cent. sodium citrate and five parts of Locke Ringer's solution containing the drug in appropriate concentrations. The final fluid contained over 1,000 microfilariae per ml. and it was incubated at 37°C. The survival of the microfilariae was studied by removing small samples and examining under the microscope. Studies were also carried out on the adult worms of *Litomusculis carinii* obtained from cotton rats and incubated at 30°C. in 4 mm. solution plus 5 per cent. horse serum.

A list is given of 5 non-metallic organic compounds tested on microfilariae. Most of these were inactive but some activity was observed in diethylquaroline

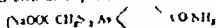
9-chloro-9-(p-dimethylaminophenyl) 10-methylacetaline

4-(p-dimethylaminophenyl) antipyrine and

4-4-dia antipyrine

and another acridine derivative in concentrations of 1 in 10 (10).

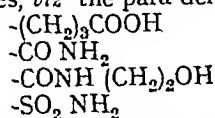
Forty-seven metal-organic compounds were tested. Many of the phenyl arsenoxide derivations were highly active (killed microfilariae in concentrations of 1 part of A in a million in 22 hours). Activity was also observed in other tetravalent arsenicals and antimonials but not in mercuric chloride or in pentavalent arsenical or antimonials. The microfilariae of *L. im* were less sensitive *in vitro* than those of *D. immitis*. The adult worms of *Litomusculis* were also more resistant to the chemicals than the microfilariae of *D. immitis* but the results were roughly parallel. Some of the more active phenyl arsenoxide derivations killed the adult worms in concentrations of one part A in a million in 22 hours. The activity of the arsono phenyl arsenoxide derivatives upon microfilariae *in vivo* was compared with their activity for mice. The most variable ratio was given by p-arsono-benzamide. This compound is relatively insoluble but a soluble derivative, the diethylcollate was prepared which was equally active and no more toxic. This compound has been developed further under the name of arsenamide.



The activity of this substance was not impaired by the presence of the water.

Part 3 describes *in vivo* studies on the filariae of dogs and cats with spontaneous infections were used. Drugs or injected into peritoneum daily for five days of the week for 45 days. The animals were killed and the adult worms were examined (usually 10-15 animals per lot). 22 contained total of over 1,200 worms. In one animal 12 per cent. returned 194 in the worms plus 49 dead worms. In one animal 10 per cent. had the worms were dead. The microfilarial count were or an increase during the treatment period but they tended to decrease.

Among the compounds tested there were four trivalent antimonial compounds, these were without any conspicuous antifilarial activity against the adult worms even in high doses (0.3 mgm Sb per kgm per day). Among the trivalent arsenical compounds mapharsen, and the trivalent analogue of carbarsone were also relatively inactive (only two rats treated). Six of the other phenyl arsenoxide derivatives killed all the female worms and many of the males, *viz* the para derivatives with



and arsenamide and melarsen oxide

It is concluded that the specific filaricidal activity of the phenyl arsenoxides is particularly associated with para-amide substitution. [All these results were obtained with only 2-3 rats per compound, so they are suggestive rather than conclusive.]

In animals treated with these arsenical compounds for 45 days, the microfilarial count often fell considerably (>50 per cent) but did not become negative. In two rats which were treated with arsenamide and then followed up for 4-6 months, the microfilarial count gradually diminished, becoming negative after about five months. [This suggests that the main filaricidal activity is on the adult worms, and that the microfilariae disappear gradually from other reasons as their source of replacement has been cut off.]

Of five pentavalent arsenicals examined, two, *viz* p-carbamyl phenyl arsenic acid and melarsen, were active, and so were two pentavalent antimonial compounds, *viz* stibanose and neostibosan. But in view of the promising results already obtained with arsenamide, these were not investigated further. Antimony compounds seem to kill the female worms more readily than male ones. If this were the same in man with *W. bancrofti*, a patient might appear to be cured because the microfilariae disappeared from the blood, but live male worms might persist and continue to stimulate pathological processes.

Part 4 describes therapeutic trials upon *Dirofilaria immitis* in dogs. Arsenicals were given intravenously and antimonials intravenously and intramuscularly. P-arseno-benzamide was given to three dogs in daily doses of 0.45 mgm. As per kgm for 37-43 days. In two, all the adult worms were killed and in the third (which survived for a year) only one female worm escaped. With arsenamide, doses as low as 0.23 mgm As per kgm per day for 11-15 days killed all the adult females, but even much higher doses had no immediate effect on the microfilarial count. [For further details, see OTTO and MAREN, this *Bulletin*, 1947, v. 44, 1083.]

Among the trivalent antimonial compounds tested, sodium antimony thio glycollate killed all the microfilariae but not the adult worms, antimony thio glycollamide gave a similar result (one dog) and stibanose (12 mgm Sb per kgm per day) was ineffective. There was no evidence that the antimonials had produced sterility in the female worms, except in dogs treated with antimony thio glycollamide. In the dogs in which the microfilariae were killed by antimonials, intense leucocytosis occurred.

[These papers describe a large scale careful investigation extending over several years and they should be consulted in the original by those interested in this subject.]

F. Hawking

SHOOKHOFF, H. B. & DWORK, K. G. Treatment of *Loa loa* Infections with Hetrazan. *Amcr J Trop Med* 1949, July, v. 29, No 4, 589-93.

Five cases of loiasis were treated with Hetrazan in doses of 100 mgm (1.3-1.7 mgm per kgm) thrice daily for seven to ten days. None showed

Alf had in the blood before (α after) treatment. They had had Calabar swellings and worms in the eye at some previous period during courses of 1-11 years. In all but one patient there was an exacerbation of symptoms when the treatment was started. In one case there was a severe reaction (pyrexia, tachycardia, precordial oppression, tightness of the chest and severe urticaria and angioedema) all but the last two symptoms subsided by the second day and the patient then saw many areas of redness under the skin which may have been the ten round worms. By the end of the week he was feeling well and later he took a second course of Hetrazan. In another patient (whose main symptoms had been pruritus) the pruritus became very severe for the first 24 hours. Otherwise there were no toxic reactions. All the patients were relieved of their symptoms (especially Calabar swellings) by the first course but in 10 relapsed and required a second course.

It is considered that Hetrazan has great therapeutic value for Calabar (but caution is required at the beginning of therapy to minimize allergic reactions).
J. HAYDOCK

MEYERHOFER H. & SCHMID G. Erfahrungen mit Phenothiazin in der Therapie der Oxyurias. Phenothiazine in the Treatment of Enterobiasis. *Deut. med. Woch.* 1949 Aug 28, v. 74 No. 33 311-312.

In Germany after the war say the authors infestation by *Enterobius vermiciformis* increased enormously. Hexylresorcinol was unobtainable and gentian violet hard to get (it was in the old equivalent of the all-momentary English ephemeris in short supply). They therefore tried hexocresol, a locally made preparation of phenothiazine, a drug originally introduced as a urinary disinfectant and later used by veterinarians for helminth infestation by trichostrongylids, strongylids and ascarids. Impure preparations or large doses caused nausea, abdominal pain and diarrhoea, so the authors use pure preparation and prefer small doses and two or more courses to a single course. Larger dosage. For children of 10 years upwards they give a tablet containing 0.7 gm. three daily for 10 days, i.e. 6 gm. altogether. For younger children half this. They have had no patients under three years of age. The tablets are given before food, with a little water. They are tasteless and are therefore taken readily. Of 330 patients so treated, 30 of them children, 139 (9 per cent) were cured (that is, no worms were seen in a two-months follow-up) by one course and 13 more (6.5 per cent) by a second course. See this Bulletin 1949, 46, 961. For an account of a much larger series treated with comparable total doses and for a discussion of possible toxic effect and the precaution to be taken see HAYDOCK J. *ibid.* this Bulletin 1949, 41, 840.
H. HAYDOCK

DEFICIENCY DISEASE

CHAILADE C. & G. Le problème de l'alimentation dans les colonies françaises. Dietary Problems and Nutrition in the French Colonies. *J. A. Med. Assoc.* Paris, 1949 Nov. 1, v. 1 No. 8 51-47.

PIERKOWSKI C. Syndrome de dépigmentation-œdème (le kwashiorkor) à Kasal. Therapeutic Trials. *J. A. Med. Assoc.* Paris, 1949 June 30, v. 2 No. 2 231-46. 15 refs.

The author describes a series of cases of deficiency diseases seen in the Belgian Congo in which the clinical features closely resembled the syndrome now generally known as kwashiorkor.

Eleven patients (seven serious) were treated with a preparation of stomach fundus (Ventriculin, Parke, Davis), receiving 10 gm daily for six consecutive days. No improvement was noted in any case.

Sixteen patients (eight serious) were treated with folic acid. They received twelve to twenty doses of 10 mgm spread over two to four weeks. In most cases no improvement was noted, in some there was definite improvement but the author could not satisfy himself that spontaneous remissions might not be responsible.

These careful trials were carried out in the homes of the patients. No attempt was made to control the diet or to eradicate intercurrent infection. The trials show clearly that neither ventriculin nor folic acid is likely to be of any use in a large-scale field campaign against the kwashiorkor syndrome, but they do not preclude the possibility that they might be useful adjuvants to a full therapeutic regime in hospital.

R Passmore

RINEHART, J F & GREENBERG, L D. Effect of Experimental Thiamine Deficiency on the Heart of the Rhesus Monkey. *Arch Pathology* 1949, July, v 48, No 1, 89-95, 2 figs [16 refs]

Five of seven rhesus monkeys subjected to repeated periods of thiamine deficiency showed dilatation of the right ventricle and auricle at autopsy. Four of them showed microscopical changes in the heart muscle. These changes were of two kinds: focal necroses of varying extent and mainly subendocardial, and small areas of cytoplasmic "hydropic degeneration" and irregular nuclear hypertrophy in the fibres of the conduction system. The latter change is considered specific to thiamine deficiency, since it has not been found in controls or in other animals subjected to equally prolonged periods of inanition resulting from deficiency of other substances.

H E Harding

RINEHART, J F, FRIEDMAN, M & GREENBERG, L D. Effect of Experimental Thiamine Deficiency on the Nervous System of the Rhesus Monkey. *Arch Pathology* 1949, Aug, v 48, No 2, 129-39, 9 figs [25 refs]

During the course of repeated deprivations of thiamine, seven monkeys showed in varying degree profound weakness and ataxia: one or more of them also showed signs of cranial nerve weakness or hyperirritability, but no clinical evidence of peripheral neuritis was observed. Examination of the central nervous system at postmortem showed changes which corresponded in a general way to those of Wernicke's encephalopathy, but differed from the latter in several respects. Bilateral symmetrical areas of degeneration confined to the grey matter were found most commonly in the corpus striatum, and were seen also in the globus pallidus, substantia nigra, mamillary bodies, corpora quadrigemina, cerebellar cortex, and in the nuclei of III, VI, VIII and X cranial nerves. The areas of degeneration resembled ischaemic infarcts, but no physical obstruction to the blood supply could be demonstrated: capillary proliferation was found only on the periphery of the older lesions, and was taken to represent an attempt at repair. No pathological changes were found in the peripheral nerves nor in the spinal cord.

H E Harding

HAEMATOLOGY

SPIES, T D, STONE, R E, GARCIA LOPEZ, G, MILANES, F, LOPEZ TOCA, R & ARAMBURU, T. Vitamin B₁₂ by Mouth in Pernicious and Nutritional Macrocytic Anaemia and Sprue. *Lancet* 1949, Sept 10, 454-6, 1 chart

Three chemical substances are known to promote blood regeneration in pernicious anaemia, these are folic acid (pteroylglutamic acid), thymine

(5-methyluracil) and vitamin B_{12} . While the detailed chemical structure of the first two has been determined, that of the third so far has not. Though the first two compounds do not protect the nervous system in cases of pernicious anaemia vitamin B_{12} does do so. Thymine must be given in such large doses (15 gm. daily) that its therapeutic use is impracticable but folic acid has proved therapeutically effective in nutritional macrocytic anaemia and in sprue. Vitamin B_{12} which has been isolated from liver extract and from streptomycin residues is the most potent anti-anaemia substance so far known. It corrects the anaemias of pernicious anaemia, of nutritional macrocytic anaemia and of sprue.

In the present paper are recorded details of the haemopoietic response of three of the 16 cases of pernicious anaemia, two of the 17 cases of nutritional macrocytic anaemia, three of the 14 cases of sprue and one of the two cases of non tropical sprue treated with vitamin B_{12} . All the patients were adults (the youngest of the nine mentioned being 54 years) free from other infections or severe complications, all before treatment had macrocytic hyperchromic anaemia, with a red cell count under three million per cmm. and a colour index over one. In all there was megaloblastic arrest in the spinal marrow. Every patient was on a diet free from meat or meat products during the period of observation and treatment. In some cases treatment was repeated on one to three occasions with variations in dosage. In the actual cases recorded the dosage of vitamin B_{12} ranged from a single oral dose of from 30 microgram. to 1,500 microgram., daily oral dosage for 10 days with 450 microgram. single intramuscular doses of from 25 to 45 microgram. and daily intramuscular doses of 30 microgram. for three days.

The authors conclude from observation of these series of cases that the minimum, maximum, and optimum doses of vitamin B_{12} vary from one patient to another, there is no generally applicable standard dosage. The compound is more effective when given parenterally than orally. Though some patients with megaloblastic marrow arrest do not respond to liver extract or folic acid or to vitamin B_{12} , most do so slowly when vitamin B_{12} is given orally in doses 30 to 60 times as great as those needed parenterally. Treatment by the parenteral route ensures more certain and rapid improvement. Though no allergy or sensitivity to injections of vitamin B_{12} was observed it is probable this will eventually be encountered and in such cases oral treatment may be necessary.

[This interesting and important paper is already summarized. It does not lend itself to further condensation and should be consulted in the original. See also this Bulletin 1949 v 40 No 3.] J. H. D. 4 Jan.

SINGER H. & ROBIN S. Rapid Test for the Demonstration of Sickle Cells and its Clinical Significance. *J Amer Med Ass* 1949, Apr 17, 139, No 16, 1021 & 2 figs. Refs. in footnotes.

The authors describe a simple and rapid test for demonstrating the sickling phenomenon in patients with sickle cell anaemia or the sickling trait.

Sickling can only occur when haemoglobin is present in the reduced state. In this test advantage is taken of the respiratory activity of the red cells and the rapidity with which sickling occurs, independent of the venous oxygenation of the blood cells present, namely the reticulocytes and white cells. It therefore occurs rapidly in all conditions and as rapidly in the fully patent with the trait as in those with anaemia.

The technique is as follows—

One drop of a turbid tooth culture of *Bacterium coli* is mixed with 1 drop of blood, the preparation sealed with paraffin and placed in the incubator at 37°C. Usually after five minutes a positive reaction shows the presence of

characteristic out cells or fully developed sickle cells. If after fifteen minutes no sickling is demonstrable the result can safely be reported as negative.

Repeated washing of the red cells with saline reduces the rate of the reaction but does not abolish the sickling phenomenon. The rate is restored if serum or bovine albumin is added.

The test should be performed as a routine for all negro patients, in view of the numerous syndromes that sickle-cell disease can simulate. There does not appear, however, to be any objection to using as blood donors persons with the trait, since trait cells appear to survive normally when injected into a normal person. [See also WILLIAMS and MACKAY, this *Bulletin* 1949 v 46 774.]

L. E. Napier

GRIFITHS, S. B. & LIPSCHITZ, R. Haemophilia in a South African Bantu. Report of a Case. *South African Med J* 1919, Aug 27, v 23 No 35 720-21 1 fig.

This case would thus appear to be the first to be reported in a South African Bantu and the second in an African Negro.

VENOMS AND ANTIVENENES

SHILOV, A. *Latrodectus reuensis* sp. nov. from Palestine. Reprinted from *Iscolory* 1918 Apr, v 29, No 2, 209-15, 12 figs. [18 refs.]

A fully illustrated description of the new spider (*Latrodectus reuensis*) is followed by a table of characters by which it may be distinguished from the two species already known to occur in Palestine (*L. VIII-guttatus* and *L. pallidus*). A brief account is then given of some aspects of the life history of the new species and this includes a list of the prey found in thirty-one webs, most of which were beetles but there were other insects and some scorpions and solfugids. Data obtained from a few experiments on the effect of the bite of *L. reuensis* on voles (*Microtus guthriei*) suggest that the venom of this spider is about as potent as that of *L. VIII-guttatus* which killed voles in seven hours.

H. S. Leeson

DONOSO BARRIOS, R. Consideraciones sobre aracnoidismo cutaneo en Chile (Cutaneous Spider-Bites in Chile). *Arch. Uruguayas de Med., Ciruj. y Hig. Ind.* 1918 Nov-Dec, v 33, Nos 5/6 184-206 3 hrs. [58 refs.] In full summary.

[The title of this article is not altogether well chosen for all spider-bites are cutaneous and all are associated in greater or less degree with systemic and not purely cutaneous symptoms.] The author divides aracnoidismo into two clinical forms, the nervous and neurotoxic due in Chile invariably to *L. reuensis* and the cutaneous which is the subject of this contribution.

Three species of spiders with the latter are found in the country. *L. reuensis*, *L. pallidus* and *L. VIII-guttatus* from the Tropics near the border with Peru to the south and to the north the southern variety is almost on the same latitude as the northern one. *L. reuensis* is found in the former production, while the latter seven to eight forms of the sea. These spiders prey on a wide variety of insects and other animals, hence among all patients not only the cutaneous but also the nervous and neurotoxic forms are found. They are found in the following places: 25 and 11 respectively. They are found in the following places: 25 and 11 respectively. They are found in the following places: 25 and 11 respectively.

hide also in crevices in walls of dwellings and behind pictures, in clothes and even in beds. In fact 18 of the 37 were bitten during sleep and 17 were bitten on the neck or arms.

The symptoms caused by the bite of *Loxosceles* Lutz or *L. m. m.* may be divided into three stages. 1. *Early period* the first 24 hours. A prickling sensation like that of a needle followed by burning pain and local oedema (both these symptoms vary considerably from patient to patient) then a "wilted oedema" and pruritus. These may be accompanied by erythema, rarely general pains (in two patients only) vomiting, shivering, bradycardia, jaundice all uncommon and seen in two or three patients only. 2. *Middle period*. Oedema over an area of 20-25 cm. round the site bitten and in 2-4 days usually—but may be earlier—a local necrosis up to 2-4 cm. in diameter with a corona of vesicles and lasting for 2-3 weeks. There may be constitutional symptoms—fever to 38°C (in one who died it reached 39.5°) with rapid pulse and rarely dyspnoea. The blood shows a fall in erythrocytes to about 3 million and in haemoglobin to 35 per cent. Leucocytosis is marked the average is 14,000-15,000 but in one patient it was 24,000. Eosinophils may comprise 20 per cent (in one 30 per cent). 3. *Clearing period*. The scab separates in three weeks or so leaving an ulcer 10-15 cm. in diameter which takes 1 month to heal. The prognosis is grave especially if signs of jaundice and haemolysis are present. Treatment is purely symptomatic no specific serum being yet available. The post-mortem findings in a fatal case are detailed. Locally on the forearm there was a dark, haemorrhagic necrotic mass involving the skin and subcutaneous tissues. Fatty myocardium and blood stained fluid in the pericardium kidneys congested, swelling of the tubular epithelium which was in parts necrotic granular cast vesicles in the interstitial tissue contained haemolysed blood. Liver dark red with yellow zones and marked granulo-fatty degeneration spleen dark and friable blood-stained urine in the bladder.

Scriales globula causes only mild symptoms, local oedema no necrosis a temperature rise to 38°C accompanied by a morbilliform rash mostly on the face chest and arms lasting for 48 hours. Other mild forms were characterized by a fleeting oedema which disappeared in a few hours or by small vesicles which cleared spontaneously in three to four days.

H. Harold Scott

DERMATOLOGY AND FUNGI DISEASES

WARRIS P. Estudio comparado del mal del pinto o enfermedad de Leon Blanco con la otras treponematosis piang, sífilis. Comparative Study of the Treponematosis, Mal del Pinto, Yaws and Syphilis. *Rev. Argent. de Dermatol. y Sifil.* 1944 Jan-June v. 32, Nos. 1-2, 23-9, 7 figs. 16 p.

An interesting account, but containing little more than the facts of the subject. The author considers the diseases mentioned in the title and also helps to point out that the causative organisms are really very closely related. The clinical symptoms group them into two groups. 1. *Primary* the same but that there is no cross-immunity between them. 2. *Secondary* the lesions and signs are not hereditary and are not transmitted by direct contact. The diseases are not hereditary and are not transmitted by direct contact. The diseases are not hereditary and are not transmitted by direct contact.

to treatment, though some lesions may be more severe with endothelial proliferation and small abscesses, but not ulceration, though the epithelial reaction may lead to keratosis and pitting. In yaws and syphilis, tertiary lesions result from an allergic state in the production of inflammatory nodules giant-cells epithelioid proliferation and caseation.

According to the author, the "ides"—palmar and plantar keratosis juxta-articular swellings—constitute the clinical common denominator of the treponematoses, and pintids correspond to lichen, psoriasis and pityriasis, and flat papillomata seen sometimes in syphilis and yaws. The hypothesis is put forward that syphilis untreated for several generations, by change in the body-organism complex evolves into the more benign form, pinta. Much has been written on the common origin of yaws and syphilis, and the same may hold good of syphilis and pinta. But the absence of cross-immunity confirms the actual independence of the diseases in question. León BLANCO has inoculated advanced syphilitics with *T. carateum*, and patients with pinta may develop a syphilitic chancre. KUCZYNSKY in Huryabamba saw a pinta patient with fresh yaws lesions and those having yaws have been seen who later developed pinta. There remains the possibility that mal del pinto has changed its character since pre-Columbian days when, as seen in tombs of the period, it produced bony lesions like those of syphilis and even yaws.

The author concludes with an observation which may be translated

Disregarding the changes which pinta may have undergone in the course of time and through the influx of new peoples, the accounts of Indian historians folk-lore, popular medicine, ceramic exhibits and pre-Columbian osteitis indicate that the three treponematoses have an American origin." H. Harold Scott

PERCLOW M I & RICH, J S. Histoplasmin Sensitivity among Cattle. *Am J Pub Health* 1949 June v 39, No 6, 719-21, 2 figs.

In making a survey of histoplasmosis among small animals especially rodents the culture method is usually employed but this involves much work and the destruction and examination of a great many animals in proportion to the very few found infected. For large animals as for man it is better to use the test of dermal sensitivity to histoplasmin, at least as a preliminary to culture methods.

a slight fall in the percentage of bovine reactors, but a further slight rise in the curve for human reactions.

An observation for which an explanation was not found was the relatively low incidence of reactors (1.1 per cent.) in 150 cattle in two institutional herds on the outskirts of Topeka compared with a rate of 7.1 per cent. reactors among 202 cattle on 71 outlying farms in the same district.

The authors conclude that both human and bovine infections are derived from a common source and that cattle do not constitute an animal reservoir of importance in human histoplasmosis.

[It should be noticed that the investigation related only to dermal sensitivity to histoplasmin, and the determination of active infection has apparently not yet been attempted.]

J. T. Duncan

SMITH C. E., SATO Margaret T., BEARD R. R., ROSENBERGER, H. G. & WHITING E. G. Histoplasmin Sensitivity and Coccioidial Infection. I. Occurrences of Cross-Reactions. *Amer J Pub Health*. 1949 June v 39 No. 6 722-26, 4 figs. [45 refs.]

The coccioidin skin-sensitivity test when properly performed, is accepted as the basis of diagnosis in primary coccioidomycosis. Nevertheless, cross-reactions may occur with extracts of other fungi, especially haplosporangium. In the course of a survey of reactors to histoplasmin, FURCOLOW and NELSON [personal communication] in the State of Ohio found among child reactors to histoplasmin some who also reacted to coccioidin. There is no known endemic focus of coccioidomycosis in Ohio and infection by *Haplosporangium parvum* may be excluded, which leaves the probability that cross-reactions with coccioidin had occurred in children dominantly sensitive to histoplasmin.

In the routine performance of the coccioidin skin test on soldiers arriving for duty in areas where coccioidomycosis exists mild or "equivocal" reactions were sometimes found in men who, apparently had never been exposed to coccioidial infection. An analysis of these cases showed that the majority came from parts of the east-central area of the United States where reactors to histoplasmin are very numerous. Among 3,378 healthy persons who gave negative or equivocal results to the coccioidin test 28 per cent. reacted dominantly to histoplasmin. Equivocal and occasionally positive reactions to coccioidin in persons who had not been exposed to coccioidial infection were found exclusively in the group of reactors to histoplasmin and the frequency and intensity of the coccioidin reaction was in measure with the sensitivity to histoplasmin.

In dominant histoplasmin reactors coccioidin used at a strength 1:10 may cause a strong non-specific reaction which may be misinterpreted, but mistakes can be avoided by the use of the test allergens in high dilution (1:1000). In dominant coccioidin reactors there was a much higher degree of cross reaction. A group of 31 persons who were negative to both coccioidin and histoplasmin subsequently developed coccioidomycosis and became sensitive to both coccioidin and histoplasmin. Dominant coccioidin reactors were also sensitive to histomycin which is allergenically related to histoplasmin.

The persistence of histoplasmin sensitivity was exemplified in a group of six reactors who had lived outside the area of dominant histoplasmin sensitivity for 10 to 21 years. Finally the geographical distribution of histoplasmin sensitivity as shown by the residential histories of the persons examined, confirmed the earlier observations of LAMBERT BLANCHET *J Hyg* 1946 v 21 673, PATON and ALLEN *Blanchet et Hyg* 1948 v 25 1 and CHRISTIE and PETERSON *J Pathology* 1948 v 51 1 J. T. Duncan

NEGRONI P Estudios sobre el *Coccidioides immitis* Rixford y Gilchrist
I Micelio vegetativo y fructificacion [Studies on *Coccidioides immitis*
Rixford and Gilchrist I Vegetative Mycelium and Fructification] *Rev Argentina Dermatofilologia* 1948, Jan-June, v 32, Nos 1/2, 50-57, 7 figs
[12 refs] English summary

This is the first of a series of papers dealing with coccidioidomycosis in South America and in it the author gives a description of the microscopic morphology of *Coccidioides immitis* which does not differ from the numerous descriptions of the fungus from North American sources. Reference is made, however, to some characters of the vegetative mycelium usually not included in other descriptions. These are *mycelium en raquette*, appressoria, nodular organs and rudimentary sclerotia. The chlamydospores, the predominant reproductive form, are developed from a differentiated proconidium which may be carried on a pedicle. The tubular proconidium divides into cubical segments of which the apical one forms the first chlamydospore. Below this, alternate segments become spores in basipetal succession, the intervening, atrophic, sterile segments behaving as disjunctors.

Although the systematic position of *Coccidioides immitis* has not been established definitely, many mycologists place it in the Order of *Chytridiales* of the Class *Phycomycetes*, a rare example of a *Phycomycete* pathogenic for animals. The probable existence of sexual phenomena in the species, as suggested by CIFERRI and REDAELLI (*Boll Sez Ital Internaz Microbiol* 1934, v 6, 141), is accepted by Negroni.
J T Duncan

NEGRONI, P Estudios sobre el *Coccidioides immitis* Rixford y Gilchrist
II Estudio micologico de las cepas autoctonas y revision del granuloma coccidioidico en la Argentina [Mycological Study of Indigenous Cultures and Revision of Coccidioidal Granuloma in Argentina] *Rev Argentina Dermatofilologia* 1948, Jan-June, v 32, Nos 1/2, 58-65, 4 figs [21 refs]
English summary

Although *Coccidioides immitis* in North America was studied in culture by OPPULS, as far back as the year 1900, DODGE (*Medical Mycology* C V Mosby Co St Louis, 1935) and, more recently, KESSEL [this *Bulletin*, 1941, v 38, 727] have indicated that the fungus in South America has not received similar attention.

Seven cases of coccidioidal granuloma have been identified in Argentina since 1892, when Posadas discovered the disease, and cultures from three of these cases were available for study. From the microscopic morphology of these cultures, described in Negroni's paper I [above], and the macroscopic characters of the colonies it was evident that the North and South American strains of *Coccidioides immitis* belong to one species.

Amongst the physiological tests applied was the auxanographic method of Beijerinck in which the capacity of an organism to utilize various selected substances as sources of necessary carbon and nitrogen is tested. For the carbon auxanogram Negroni used glucose, laevulose, mannose, galactose, rhymnose, maltose, lactose, saccharose, trehalose, raffinose, inulin, dextrin, arabinose, mannitol, glycerol, sorbitol, acetate of soda, citrate of soda, oxalate of soda and tartrate of soda, and found that the monosaccharides and acetate of soda were the most suitable. For the nitrogen auxanogram he used peptone, asparagin, ammonium sulphate, urea and ammonium chloride and found ammonium chloride to be the simplest source of nitrogen.
J T Duncan

VIÑOL, I. *Estudio sobre el *Coccidioides immitis*. III. Estudio micológico comparativo de las cepas Argentinas y Norteamericanas. (Studies on *Coccidioides immitis*. III. Comparative Mycological Study of Argentine and North American Strains.)* *Rev. I. gerencia Dermatol. y Sif.* 1942, July-Dec. v. 72, No. 74, 719-31, 4 figs. English summary.

Previous papers above dealt with the morphology of the vegetative and reproductive stages of *Coccidioides immitis*. They drew attention to some hitherto unnoticed characters and presented a mycological study of three strains of the species isolated in South America. The present paper describes the comparative study of the three South American (Argentine) strains and eight from North America to determine if any morphological or physiological differences exist between the two groups.

In the physiological study, tests were made of the capacity of the vegetative fungi to utilize certain substances as sources of essential carbon and nitrogen as already described in paper II. The results of these tests, set out in tabular form, show that all of the substances examined could be utilized by at least some of the strains, often very freely, and where differences existed among the strains there were not related particularly to the North and South American groups. The most suitable sources of carbon for all strains were D-glucose, saccharides and sodium acetate. Peptone, asparagine, histidine, urea, ammonium sulphate and potassium nitrate were tested as possible sources of nitrogen and all were found to be usable, ammonium chloride being the simplest. The test did not reveal any difference between the North and South American groups. Other physiological properties such as the production of haemolysin, the power to coagulate and digest milk and to liquefy coagulatum were varied with individual strains but the differences had no geographical relationship. The bacteriologically familiar hydrogen sulphide, indole, casein and nitrate reduction tests gave negative results with all strains, and the optimum temperature for vegetative growth was 30°C. for all except one strain (U.S.A. 641).

The addition of a particular animal or vegetable fat—butter, lard, olive oil or olive oil—the culture medium failed to show any difference between the two groups of cultures in respect of the growth of aerial mycelium, production of spores or the depth of colour on the surface or reverse of the colony, but marked differences were found between individual strains.

Coccioides prepared from individual strains from North and South America and tested on guinea pigs inoculated by infection with individual strains of the two groups showed no difference in the reactions elicited.

Finally, morphological tests confirmed the results of the other tests which indicated that authentic strains of *Coccidioides immitis* from North and South America belong to one species. The only exception was strain U.S.A. No. 641, labelled *Ull. tronycosa*, Chicago, Ill. 1941, which appears to be a form of *Sporium fus* and therefore should not have been included in the comparative study.

J. T. Duncan

VIÑOL, I. P. A. VIÑOL, D. *Estudio sobre el *Coccidioides immitis*. IV. Virulencia de las cepas y su relación con los caracteres micológicos. (Studies on *Coccidioides immitis*. IV. Virulence of the Strains and its relation with the Mycological Characters.)* *Rev. I. gerencia Dermatol. y Sif.* 1942, July-Dec. 72, No. 74, 279-81, 1 fig. English summary (10 lines).

In an earlier report (see I. 1942) it was shown that with single possible exceptions (U.S.A. strain 641) 8 strains of *Coccidioides immitis* from the United States and 3 from Argentina, although presenting minor differences, morphologically belonged to the same species. The present report deals with a study of the virulence of these 11 strains and a possible relation of particular

morphological features. The cultures, grown in a synthetic liquid medium were inoculated by the peritoneal route into 65 guinea-pigs. The 11 strains showed wide differences in pathogenicity and virulence as judged by the extent and duration of the disease and its ultimate result, but no relation was found between the pathological effects on the one hand and the morphological peculiarities of a strain or the amount of the living culture inoculated on the other. One strain (No. 694 referred to above), of uncertain authenticity, was wholly non-virulent.

J. T. Duncan

NEGRONI, P., DAGLIO, C. A. N. & BRIZ DE NEGRONI, C. Estudios sobre el *Coccidioides immitis* Rixford y Gilchrist. V. Primera investigación sobre la existencia de una epidemia de coccidioidomicosis en la Argentina. [Studies on *Coccidioides immitis* Rixford and Gilchrist. V. First Investigation on the Existence of an Epidemic Focus of Coccidioidomycosis in Argentina.] *Rev. Argentina Dermatofisiología* 1948, July-Dec., v. 32, Nos. 3/4, 250-63, 8 figs. [25 refs.] English summary.

The discovery, mainly through the use of the coccidioidin skin-sensitivity test, of widespread, mild or subclinical coccidioid infection in endemic areas in the United States, where hitherto the disease, known only in its grave disseminated form, was considered to be relatively rare, prompted a similar kind of investigation in South America. Although coccidioid granuloma was first identified in Buenos Aires by Posadas in 1891, less than a dozen cases of the disease were reported in South America during the following half-century. The identification of a case of coccidioidomycosis in Rio Colorado, Argentina, in October 1947 provided the opportunity to investigate the possible existence of an endemic focus of the disease in the neighbourhood. For this purpose the coccidioidin skin sensitivity test was carried out on children in the primary schools. In the first school dealt with in Rio Colorado, 15 out of 190 children (7.97 per cent) were found to be coccidioidin-sensitive and one child aged 11 showed an intense reaction. Out of 1,834 primary school children examined in General Conesa, Rio Colorado, Choele Choele, Stefenelli, General Roca and Neuquén, 137 had apparently, suffered from asymptomatic coccidioidomycosis. In all, 2,665 school children of ages ranging from 6 to 15 years were examined by means of the coccidioidin test. Of these the highest proportion of reactors was found in Rio Colorado where 10.26 per cent positive and 5.41 per cent doubtful reactors occurred amongst 562 children. In Stefenelli with Gral Roca the corresponding figures were 1 per cent and 1.66 per cent, respectively, and in other areas the proportion of positives ranged from 4.34 per cent to 7.56 per cent. Children in the Rio Colorado area gave not only the highest incidence of reactors but also the greatest frequency of strong reactions.

Judged by the incidence of reactors, the geographical, geological and climatic factors influencing the distribution of the disease were those associated with the arid, steppe-like regions. It is proposed therefore that irrigation should be a first step in dealing with the problem.

Apparently a study of the desert rodents was not included in the survey. (See also this *Bulletin* 1949 v. 46, 167.)

J. T. Duncan

NEGRONI, P. & BRIZ DE NEGRONI, C. Estudios sobre *Coccidioides immitis* Rixford y Gilchrist. VI. Segunda contribución al estudio de la epidemia coccidioidomycótica Argentina. Second Contribution to the Study of Coccidioidomycotic Endemicology in Argentina. *Rev. Argentina Dermatofisiología* 1948, July-Dec., v. 32, Nos. 3/4, 264-6. English summary (7 lines).

This paper is a sequel to the recent report [above] on the examination of primary school children in Argentina by means of the coccidioidin skin test.

The present report deals with the results of similar tests on adults. Reference is made to an earlier study of 6 cases of coccidioidomycosis (Negros paper II above) in persons who had resided in the west of the Province of Córdoba, in the central Pampas and in the Territory of the Rio Negro in areas corresponding in climatic and geological characters to the endemic areas of coccidioidomycosis in the south-western United States.

The present survey embraced 208 adults—178 males and 130 females—who were inmates of five hospitals. Twenty five of these were coccidioidomycosis-positive and 17 others gave doubtful reactions. Of the two sexes, 11.53 per cent. of the females and 5.71 per cent. of the males were reactors. The distribution by residence of persons giving the most marked reactions (+ +) pointed to possible endemic foci in the north and west of the Province of Buenos Aires and the desert areas of the steppe and hill country.

J. T. Duran

FRISHLANDER, J. & MOSS, C. Chromoblastomycosis. *South African Med. J.* 1919 Sept. 7 & 23 No. 36 791-2 3 figs.

A case of chromoblastomycosis occurring in an Indian is described. The condition was an extensive one involving the right leg (which was amputated) the amputation stump, right hand, forearm, arm, anterior surface of the right upper chest and the left hip.

WHITAKER, H. W., Jr. North American Blastomycosis. Report of a Case in which a Patient with Meningeal Involvement was Treated with Streptomycin and Procin. *Arch. Pathology* 1919 Sept. 1 & 48 No. 9 1-17 4 figs. (Refs. in footnotes.)

"The literature of systemic blastomycosis with meningeal involvement is reviewed, and an additional case in which the patient was unsuccessfully treated with streptomycin and procin is reported in detail.

TROPICAL OPTHALMOLOGY

A REVIEW OF RECENT ARTICLES. LIII

Trachoma.—Trachoma in Afghanistan is discussed in a brief article by HAUM.¹ The disease is very widespread and was present in 85 per cent. of all cases. It occurs in very severe forms and a very great number of all those afflicted go partly or totally blind largely due to lack of even the most elementary rules of hygiene and adequate treatment.

In Afghanistan the disease is spread from one eye to another by flies and repeated wiping of the secretion with dirty rags or the gowns of the women. The latter are used for every possible purpose including blowing of noses and cleaning the eyes of children.

The author considers that the disease is curable provided regular treatment is started in the initial stage and carried on for many months. Prevention of trachoma will only be possible when hygiene can be brought to the inhabitants not only by a doctor but through schools, teachers, church and district officials.

¹ For the 2nd of this Series see Vol. 44, pp. 657-671.

Review of L. Trachoma in Afghanistan. *South African Med. J.* 1919 May 1 22 No. 14 14-15.

A preliminary report on the use of Solufontamide in trachoma is reported by KADER and RADWAN²

This drug is a 33 per cent solution of Fontamide (p amino-benzene-sulphonyl-thiourea). It is a clear, slightly viscous and practically colourless liquid with a density of 1.16 at 15°C and a pH varying from 6.8 to 7.2. The investigation was carried out in Egypt on 60 patients. Usually six subconjunctival injections of one-half to one cubic centimetre each were given in the upper fornix. Two injections were given each week. Treatment was ambulatory and patients were allowed to go home immediately after the administration of the subconjunctival injection.

Very good results were obtained in cases of follicular trachoma, trachomatous ptosis, trachomatous pannus, corneal ulcers and infiltrations and keratitis.

Solufontamide, in addition to its curative effect, is better than other sulphonamide compounds because the subconjunctival injections are painless. It may produce a slight chemosis and subconjunctival ecchymosis which disappear in a few days. No toxic effects occur from its use.

Kerato-Conjunctivitis—Three cases of kerato-conjunctivitis in Hawaii, due to the juice of the crownflower *Calotropis gigantea* are reported by Wong³. In the cases described the milky juice entered the eye when an overhead flower was plucked. The juice contains a powerful toxin which is capable of causing a severe kerato-conjunctivitis, denudes the epithelium of the cornea and conjunctiva, penetrates the cornea and causes an oedema of the corneal substance which results in large folds in Descemet's membrane. There is also an accompanying miosis and congestion of the iris. The marked reduction in vision in the patient is due to the change in the refractive media by the oedema of the cornea. The visual impairment is temporary and varies in duration from five to seven days. There is no permanent injury to the eyes. Treatment is symptomatic.

Trypanosomiasis—Lesions of the optic nerve in African trypanosomiasis are discussed by Toulant, Larmande and Toulant⁴.

In French tropical Africa, it would appear that affections of the optic nerves are very frequent, but the part that the trypanosome plays in the different lesions is still confused.

Bertrand [this *Bulletin*, 1935, v. 32, 476] in 1935 found 40 lesions of the optic nerve, of which 16 were blind, in 707 inhabitants of Tchoho and 12 cases of optic atrophy in 773 inhabitants of Peida (Togo).

Lefrou and Goarnisson [this *Bulletin*, 1939, v. 36, 738] at Onagadougou (Ivory Coast) have examined the eyes in 1,232 cases of trypanosomiasis and found ocular lesions in 31 per cent of recent cases and 20.1 per cent in old cases. But in 537 cases in which the trypanosome was not found similar ocular lesions were present in 22.3 per cent. The lesions found were optic neuritis or papillitis, papillary oedema and optic atrophy.

The two first are found in the second period of the disease and are due to vascular lesions or the presence of the trypanosome in the sheaths of the optic nerve. In sleeping sickness, vascular lesions are characteristic and the trypanosome has actually been found by pathological examination in the sheath of the optic nerve and also in animal experiments.

These two lesions are not serious and usually clear up rapidly without going on to optic nerve atrophy.

²KADER M. A. & RADWAN, M. H. Preliminary Report on the Use of Solufontamide in Trachoma. *J. Roy. Egyptian Med. Ass.* 1948 Nov. v. 31, No. 11 896-9.

³WONG W. W. Keratoconjunctivitis due to Crownflower. *Hawaii Med. J.* 1949, May-June v. 8 No. 5 (33-4), 1 fig.

⁴TOULANT, P., LARMANDE A. & TOULANT M. Les lésions du nerf optique au cours de la trypanosomiose africaine. *Bull. Acad. Na. Méd.* 1949 v. 133 Nos. 23/24 470-84 [40 refs.]

Atrophy of the optic nerve is very commonly found in the ordinary routine examination of eyes in tropical Africa. According to Bertrand, the percentage is from 1.4 to 7.4.

Leffson and Goarnison found percentage to be 1.6 in cases in which the trypanosome was not found and in cases in which it was found the percentage was 7.5 in first cases and 3.5 in old cases. The atrophy is either post-neuritic or primary and can be either partial or complete. Sometimes the optic atrophy is accompanied by choroido-retinitis. It is however questionable whether the choroido-retinitis is a result of the optic nerve lesion or the actual presence of the trypanosome or to the presence of another infection such as onchocerciasis.

In tropical Africa the causes of optic nerve lesions are numerous and as the part played by the trypanosome is uncertain. LAMBLIN and MEYER in their classical monograph in 1904 do not mention ocular complications in trypanosomiasis. HETWET and MEYER scarcely mention them. RIBIER (this Bulletin 1940 v. 43 531) attributes most of the blindness to onchocerciasis. Goarnison states that ocular manifestations are slight and unimportant. On the contrary other authors consider that ocular manifestations are commoner than one is led to believe. DUMAS-MEYER (this Bulletin 1931 v. 31 576) and HANIC consider that 80 per cent. of old cases of trypanosomiasis has narrow retinal blood vessels. History examination prove that ocular complications are rare although the trypanosome can invade the sheath of the optic nerve and retina. The question also arises whether the lesions are due to the direct action of the trypanosome or of a toxin produced by it or allergic reactions produced by the destruction of the trypanosome by drugs or to arachnoiditis involving the optic chiasma.

Other lesions of the optic nerve in tropical Africa which have confusion with those caused by the trypanosome are due to treatment with the arsenical preparation atoxyl and trypanamide. Injections with these drugs have produced permanent defects of vision or blindness. The doses should be small and the preparations freshly prepared and even then optic nerve lesions occur due to hepatic insufficiency. Onchocerciasis has been attributed as a frequent cause of optic nerve atrophy in cases of trypanosomiasis in the Gold Coast.

Syphilis gives the same ophthalmoscopic picture as trypanosomiasis among different workers and 70 per cent. of cases of trypanosomiasis have shown a positive reaction to syphilis. Ankylostomiasis, although common in tropical Africa, cannot be considered a cause of optic nerve lesions.

Vitamin deficiencies are very common among the peoples of tropical Africa and are responsible for lesions of the optic nerve and if they do not explain all the lesions they at least can favour the appearance of ocular complications in the course of trypanosomiasis as they do in arsenical intoxication.

MALTA.—A case of ocular myiasis in Gibraltar is reported by CAS.

The patient was a healthy Spaniard of 75 years of age. Eleven maggots in all were found in the conjunctival sac some of these had burrowed into the cornea. The larvae were identified as those of *Pha. communis* (species not stated). It is probable that the adult fly entered the eye with food and the eye became somewhat injured. The pain became intense with swelling of the eyelids, they arose in and put spots. The conjunctiva was oedematous and very inflamed. After removal of the maggots under cocaine anaesthesia the inflammation subsided.

The most common fly which causes myiasis, being the Muscidae among which the common house fly is the most usual cause of the trouble. If these

flies do lay their eggs in the conjunctival sac, the majority lay them on the surface of the conjunctiva, but some are more dangerous, as these maggots burrow below the conjunctiva and penetrate the globe

The Oestridae possess ovipositors and can lay their eggs beneath the conjunctiva itself and one of them, *Hypoderma bovis*, can penetrate the globe. Such cases of intra-ocular myiasis are very rare

The Sarcophagidae and Anthomyidae can also infect the conjunctiva of man

Cysticercosis—This article by JUNIOR⁶ represents the experiences of the ophthalmologists and pathologist of the Instituto Penido Burnier with 111 patients bearing 116 ocular cysticerci. The parasites were situated as follows—51 in the vitreous, 10, subhyaloid, 44, subretinal, 2 in the anterior chamber, 7, conjunctival, 1 in the orbit, and 1, subcutaneous in the region of the lacrimal sac. The youngest patient was aged 2½ years, the oldest was 66 years of age. There was a slight predominance in women—64 female and 47 male patients. Ocular cysticercosis is a rare disease (116 in 54,000 patients). The majority of the patients were labourers or farm workers who came from rural areas and whose concepts of hygiene were primitive

Ocular cysticercosis obeys the same laws of general infestation as *Cysticercus cellulosae*, the larva of *Taenia solium*

Heteroinfection is more common than autoinfestation. The parasite is found in all the tissues of the eye except the lens. When intraocular, the first symptom is reduction in vision. During the first months of infestation, if the media are clear, the cysticercus can be positively identified by its bluish-white spherical vesicle with peripheral iridescent reflexes and slight undulatory movements. The scolex when evaginated reveals the sucking cups and when invaginated appears as a denser white spot in the centre of the vesicle. When the media are more turbid, diagnosis is more difficult, as the parasite causes an exudative choroiditis and even panophthalmitis. Detachment of the retina, synechias of the iris, complicated cataract and atrophy of the eyeball may occur. The parasite is more often encountered in the inferior vitreous. In 73.2 per cent of cases the complement fixation reaction in the blood is positive and so is a valuable aid in diagnosis

Treatment consists in early extraction of the organism, living or dead, as it is destructive to the eye

Localization of the parasite with non-perforating diathermic cauterizations nearer and nearer to the vesicle should be done until the exact place has been accurately found by ophthalmoscopic examination. It is then removed by the transcleral route

E O'G Kerwan

TROPICAL ULCER

BERRY, W T C *Tropical Ulcer Studies in its Causation* *J Roy San Inst* 1949, Sept, v 69, No 5, 625-32 [10 refs]

Tropical ulcer is defined as a sloughing pyogenic lesion, most common on the leg below the knee and usually associated with fusiform bacilli and spirochaetes. The author remarks that probably more money is spent on its treatment than on that of any other single tropical disease and that even if it is treated with success a scar is left which is always liable to break down and lead to deformities. Healthy subjects appear to be relatively resistant to infection,

⁶JUNIOR L. Ocular Cysticercosis [Translated by Charles A PERERA] *Amer J Ophthalm* 1949, Apr v 32 No 4 523-47, 23 figs

and it has been suggested that a deficient dietary is a predisposing cause. It is there is much difference of opinion as to the factors responsible.

The incidence of ulcers was studied in a fishing village on the shores of Lake Nyasa and in a hill village on the escarpment of the Great Rift Valley flanking

nature of abrasions was more severe in the former, being more apt to cause bruising of underlying tissue. The author carried out investigations in the hill village. Forty children were fed with boked dried meat three weekly and the amount was adjusted so as to supply an average of 1.5 grammes of animal protein per lb. body weight daily. It was estimated that an equal or greater amount of vegetable protein was already given in the daily diet. Two control groups were used and it was found that there was no difference between the three groups in relation to total abrasions, the time they took to heal and the number progressing to ulceration.

A group of children was fed for five months on a supplement of baker's yeast. They were given an average daily intake of 0.495 mgm. thiamin, 1.07 mgm. riboflavin and 16.6 mgm. nicotinic acid. The test was carried out at the height of the ulcer season and no controls were used, but the results did not appear to show any advantage in these supplements.

The exudate from 795 consecutive abrasions was stained by Gram's method. Abrasions were at first infected with cocci only, but a typical infection of *Staphylococcus aureus* was superimposed in 120 instances, thus being usually followed by a deterioration in the local condition. It was commoner in the wet than the dry season, while a higher percentage of abrasions healed spontaneously in the latter season. It was considered that mucous flora, more common in the wet, acted as vectors. In one experiment containers filled with fresh blood, frozen rotten fish and pus from ulcers were placed in the open and the flies (*Musca domestica*) although they might alight on one of the five or three containers almost at once moved on to the pus. As a result of three years work the author was deeply impressed by the importance of non-bacterial factors in the causation of tropical ulcers.

A small area over the external malleolus of volunteers was infiltrated with 2 per cent novocain and the outer skin gently pinched away until the blood vessels showed pink through the corium. Pus from a well-established ulcer was smeared on the area and the site protected by a small cardboard cage fixed by a piece of elastoplast which did not get completely round the leg. The subject carried on his work as usual. Seven cases so treated developed ulcers. One volunteer was successfully inoculated over the external malleolus but inoculation over the condyles of both humeri failed. Another who was successfully infected over both external malleoli was treated for three days with one leg turned on Thomas's splint and the other kept lowered to ground level. It was found that when after this both legs were raised the former healed more rapidly than the latter. Two Africans with severe Louis Vincent's infection of the gums were inoculated on the leg and the result but the results were negative. A final malleolus the more extensive trial and investigation of inoculation of volunteers.

A marked difference appears to exist in the severity of the condition in different parts of the world. In the United States 1938-39 15 cases. The author suggests that subjects with inadequate intake of vitamin B complex are hampered in dealing with anaerobic organisms by failure of reduction-oxidation reactions and that the tissues of the leg are at a disadvantage with

those of the arm owing to delay in the superficial venous and lymphatic return, this being possibly accentuated by a mild anaemia

In the ensuing discussion, AMELI (Iran) drew attention to the fact that tropical ulcer was unknown in most parts of Iran, but was prevalent on the shores of the Persian Gulf where the climatic conditions were quite different from those in the rest of the country and where, moreover, fresh fruit and vegetables were scarce and expensive. He thought that fusiform bacilli and spirochaetes were secondary infections and that some other, probably ultramicroscopic, organism was responsible. PROCTOR (observations in Kenya) considered that there was always a dietetic basis to the causation of tropical ulcer, and asked whether lack of vitamin C might not be a predisposing factor.

In reply, Dr Berry said that while no definite proof had been obtained of a specific dietetic cause, yet faults in the diet were so commonly found in association that there was almost certainly something in this. Panda in India had produced ulcers by inoculation of cultures of fusiform bacilli which suggested that ultramicroscopic organisms were not essential. BAKER in Somaliland had concluded that shortage of vitamin C was not a causative factor.

C F Shelton

BOIVIN. Le traitement des ulcères tropicaux par les injections intra-artérielles d'Exadyl et de novocaïne et les infiltrations sympathiques lombaires [Treatment of Tropical Ulcer with Intra-Arterial Injections of Exadyl and Novocaïne and Sympathetic Lumbar Infiltration] *Ann Soc Belge de Méd Trop* 1949, June 30, v 29, No 2, 91-7

Exadyl, an amido phenyl hexane compound, occurs in the form of a white odourless powder, soluble in cold water in a 7 per cent solution, very soluble in warm water and warm alcohol, and is administered in a 0.1 per cent solution. The vehicle is not mentioned—presumably it is distilled water or normal saline.

Injections are given twice daily during treatment in 20 ml amounts followed by an injection of 1 per cent novocaïne (20 ml), which, according to the author, is followed by a local rise of temperature accompanied by vaso-dilatation. In very nervous patients a preliminary subcutaneous anaesthesia is administered. In two very severe cases a paravertebral infiltration was given in addition to the intra-arterial injections.

The pulsations of the femoral artery are palpated below the crural canal. A lumbar-puncture needle is used and the left index and middle fingers are placed at the level of the artery while the right hand pushes the needle obliquely inwards to a depth of about 2 or 3 cm, on withdrawing the stylet blood spurts out. The syringe containing the solution is attached and, to make certain that the artery has not been transfixed, pressure is stopped after 1 or 2 ml have been injected and blood flows back into the solution. After injection the patient remains at rest in the horizontal position for ten minutes with a pad fixed to the site of injection. Paravertebral infiltration with 1 per cent novocaïne is carried out according to the standard technique, a Tuffier's needle being used. Exadyl does not cause any toxic reactions.

Phagedenic tropical ulcer is greatly improved by intra-arterial injections of this drug with novocaïne given by the same route or by paravertebral infiltration as an adjuvant. In addition local treatment and administration of bismuth should not be neglected. As the author remarks, the numbers of treatments recommended for tropical ulcer are legion and he considers that their very diversity is a proof of their lack of specificity.

[No mention is made of the possibility of a weak patch occurring in the artery as a result of frequent punctures.]

C F Shelton

MISCELLANEOUS DIAPYCNES

BEET, E. A. Primary Splenic Abscess and Sickle Cell Disease. *East Afr. Med. J.* 1949 July 1, 24 No. 7 182-184 10 ref.

An African male aged 25 was admitted to hospital at Broken Hill in Northern Rhodesia on January 21 1949. A week before admission he developed a headache the next day complained of pain in the left side and on palpating this area he felt a tender mass "like a stone". The mass increased in size breathing became difficult and three days before admission he noticed that his conjunctivae were becoming yellow. In 1941 the patient suffered from a left-sided pneumonia and the author suggests that this may have been a splenic infarct.

On admission there was marked wasting with pronounced jaundice of the conjunctivae and pallor of the mucous membranes. The spleen was very enlarged and tender and immobile on respiration. The liver was not enlarged. The patient was afebrile but looked ill and was in great pain.

Blood count: Red cells 2,800,000 per cmm. leucocytes 18,000 (neutrophils 79 per cent.) haemoglobin 8.1 grammes per 100 ml. (Sahl) colour index 1.01 reticulocytes 2 per cent. The red cell morphology was normal and no nucleated red cells, sickle cells or malaria parasites were found. In a sealed preparation of blood (9) to (10) per cent. of red cells showed sickling within four hours. The direct Van den Bergh and Hahn tests were negative.

On January 29 the splenic swelling was softening below the costal margin and there was a definite tympanic note over this organ while the temperature was rising and the patient's condition deteriorating. Aspiration 1½ inches from the midline just below the costal margin produced foul smelling pus followed by 24 oz. of reddish brown pus. 250,000 units of penicillin was instilled into the abscess cavity. On January 31 although the general condition had improved and the temperature had fallen the spleen was still very tender and a drainage tube was inserted into the abscess. 24 oz. of pus were evacuated and continuous drainage into a bedside bottle was begun. 40 oz. of pus subsequently drained away. On February 4 the condition had again deteriorated and the abscess was again drained, much pus being found. A drainage tube was inserted. This drain was removed on February 16 when the condition had greatly improved, the jaundice become less and the spleen smaller and not tender.

On March 8 the patient was up and convalescent. The spleen was still palpable but not tender and the wound was dry. Red blood cells were 4,250,000 per cmm. leucocytes 6,800 per cmm. sickle cell rate and red cell morphology be-

mixture (9) grains daily was administered from January 23 to March 11.

The amount of pus drained is remarked upon 11½ oz. being removed although the actual amount was probably much more. The jaundice was considered to be due to an acute haemolytic process and while the anaemia was ruled out in the following general absence of nucleated red cells and nucleated red cells in blood smears. There were 4 reticulocytes no sickling present after one hour in the sealed preparation. A primary blood rapid increase in the red cell count after surgical drainage of the abscess and administration of iron and fall in the leucocytosis as the patient's infection was overcome. A mixed, a haemolytic anaemia can follow an infection with anaerobic haemolytic streptococci and *C. coli*.

The author however considers that this was due to an infection of an infarct of the spleen the latter being due to splenic infarction within this organ. Owing

to the sluggish circulation in the splenic pulp conditions are favourable to a degree of anoxia sufficient to cause sickling in susceptible red cells, the sickled cells becoming entangled and causing still greater anoxia, thus predisposing to the formation of an infarct which may become infected and go on to abscess formation

[As this condition has not, apparently, been previously recorded in East Africa the clinical picture is fully described.] C F Shelton

TURIAF, J, BLANCHON, P & CABAIL, J L Syndrome de Löffler (formes aiguës fébriles et formes mineures) Asthme et ascariodose [Löffler's Syndrome (Acute Febrile Forms and Minor Forms) Asthma and Ascariasis] *Bull et Mém Soc Méd Hôpit de Paris* 1948, Nos 36/37, 1204-14

The authors have used five cases as a basis for a discussion on Löffler's syndrome

Case (1) The patient had severe asthma-like attacks associated with fever and eosinophilia X-ray showed lung infiltration which had completely cleared in two months The eosinophilia resolved and there was a lymphocytic reaction There were no ova in the stools and chenopodium produced no worms

Case (2) was a true asthmatic who had an attack of Löffler's syndrome with fever, eosinophilia 63 per cent reduced to 21 per cent within a month and to 2.5 per cent after two more months Lung fields cleared in about a month No *Ascaris* were found at the time, but one was passed 18 months later

Case (3) A woman aged 21 who had a history of asthma since the age of five She had a febrile attack with lung symptoms, but no asthmatic attacks There were two areas of infiltration in the left lung, in the sub-clavicular area and at the base The blood picture was at first normal, but later she developed an eosinophilia (14 per cent) The stools showed both *Ascaris* and *Trichuris* Pulmonary tuberculosis was excluded The lung fields cleared within two months, but about three months later she had another febrile attack, this time without X-ray evidence Later, the asthmatic attacks returned and persisted despite treatment but the lung fields were still clear Both worm infections persisted

Case (4) Developed asthmatic attacks at the age of 23 years Several attacks had occurred during the year, but no typical asthmatic history and no associated allergic diseases, or family history were present. When seen a year later the patient had an attack associated with a temporary infiltration of the lung, and an eosinophilia of 17-20 per cent, ending at 13 per cent with a lymphocytic reaction up to 50 per cent No *Ascaris* were found

Case (5) A youth of 16 developed his first attack when he had been in Paris for one month Loss of weight was present, but neither fever nor night sweats there were asthmatic attacks Two episodes of infiltration occurred but with little eosinophilia and that only at second attack (8 per cent) No *Ascaris* were found

The authors first point out that acute febrile forms are not as rare as they are generally considered to be They may take the form of an acute 'pneumopathy' or of a minimal transient lung infiltration with the characteristic radiological and blood pictures A severe case may simulate pneumonia In the minor forms, the diagnosis depends entirely on the radiological picture of small round, sometimes very homogeneous, lesions, which may be mistaken for small tuberculous foci, but which resolve rapidly and compel a revision of the first impression and the associated sharp but transitory rise in the eosinophile count

In their five cases the left lung was involved in four other writers to make a part of the frequency of right lung involvement. They noted a high leucocytosis (37,400 with 83 per cent granulocytes and 163 per cent eosinophils in one case) and in three of their cases that were followed for a sufficient time there a terminal lymphadenosis.

On the subject of aetiology they point out that in only two of their cases was a *T. axei* demonstrated despite the careful and systematic search. They cannot accept the view that Löfller's syndrome can be explained as due to pulmonary ascariasis for this and for other reasons which they give. They consider that transient eosinophilic pulmonary inflammations of an allergic and not a mechanically irritative nature are caused by a variety of foreign organisms or endoparasites and that in the lungs of climatic subjects these organisms find a particularly favorable milieu.

L. F. Nafiz

PROTOZOOLOGY CENTRAL

FRANKEL, J. H. Pathogenesis, Diagnosis and Treatment of Human Toxoplasmosis. *J Amer Med Ass* 1949 May 28; 142 No 4 741-747 5 figs. (Refs in footnotes.)

Four clinical types of *Toxoplasma* infections in human beings are recognized viz. (a) congenital or neonatal meningo-encephalitis (b) atypical encephalitis (c) post-encephalitic sequelae and (d) pneumonitis associated with fever and a rash.

A historical account of toxoplasmosis in animals and man is given, much condensed but with numerous useful references to original sources.

The pathogenesis of the infection is next considered under the head "acute," "subacute" and "chronic toxoplasmosis."

Acute toxoplasmosis

The acute infection is generalized, involving every organ and most tissues although the lesions are microscopic. *Toxoplasma* bodies are found in peripheral macrophages, fibroblasts, reticular and sinusoidal cells, endothelial cells in the lungs, smooth and cardiac muscle and neurons and macrophages of the central nervous system. The clinical symptoms produced may be interstitial pneumonitis, myocarditis, encephalitis, splenitis, hepatitis and orchitis with a cutaneous rash and icterus may be present. Too few human cases in the acute stage have been examined to evaluate the factors operating in the various organic lesions but are seems to be an important factor in the lesions of and at autopsy seem to be more severe and extensive in children than in adults. It has also to be remembered that the cutaneous lesions are asymptomatic especially in adults and may even be no disease.

Subacute toxoplasmosis

This term designates cases in which the infection regresses in the other tissues but continues active or even progressive in the central nervous system and eyes. Most of these cases will have been antenatal or neonatal infection. *Toxoplasma* bodies are not found in the brain tissue but in the central nervous system macrophages which are present everywhere with the presence of *Toxoplasma* bodies. The source of *Toxoplasma* bodies from the other tissues may be explained by the presence there of an acquired immunity whereas this is absent or ineffective in the central nervous system owing to

poor diffusion of serum antibody into brain substance. Another characteristic lesion in the brain is a periventricular reaction zone surrounding the lateral and third ventricles. This consists of four strata indicating, in succession, cellular infiltration and microglial proliferation, thrombosis of large vessels, cellular necrosis and repair.

The clinical symptoms and signs of subacute toxoplasmosis are hydrocephaly and convulsions, chorio-retinitis, retinitis and iridocyclitis. The outcome in subacute cases is often fatal.

Chronic toxoplasmosis

This term designates cases where there is clinical or laboratory evidence of toxoplasmosis but no obvious widespread activity. *Toxoplasma* bodies have not been isolated from such cases and so the question of their persistence or otherwise cannot be answered. The recurrence of active chorio-retinitis in patients showing the scars of subacute toxoplasmosis would favour the theory of persistence as would the occasional finding of apparent *Toxoplasma* pseudocysts in routine autopsy material. The clinical signs and symptoms of chronic toxoplasmosis depend on the damage produced during the acute and subacute stages. The most frequent findings are chorio-retinitis, electroencephalographic evidence of cerebral damage, cerebral calcifications and other signs such as microcephaly, hydrocephaly, ocular malformations and spastic paraplegia.

Transplacental toxoplasmosis

There is much direct and indirect evidence of the antenatal infection of cases and the question arises as to whether the mother contracted toxoplasmosis during pregnancy or had a previous latent infection, allowing a ruptured pseudocyst to infect the foetus *via* the placenta.

Diagnosis

The isolation of *Toxoplasma* from the patient is the final proof of infection, but this is not always possible and immunological and serological procedures of diagnosis have to be undertaken.

Toxoplasma can be isolated in acute cases from the blood, bone marrow, spleen, cerebrospinal fluid and, possibly, sputum.

In the subacute stage the bodies have been found in ventricular fluid and in the brain at autopsy.

Direct demonstration of the bodies in smears is rarely possible except from sedimented ventricular fluid, and animal inoculations must be resorted to. Groups of various animals should be used, mice, hamsters and guinea-pigs, sub-inoculations being carried out if necessary.

The tests to be carried out when no organism can be isolated vary and are enumerated below without details. For these the original descriptions, to which references are given, should be consulted.

The tests denoted are an antigenic test for the demonstration of *Toxoplasma* antigen in ventricular fluid of infants with hydrocephalus, cutaneous tests with *Toxoplasma* antigen (*toxoplasmin*), an *in vitro* test for hypersensitivity to *Toxoplasma* antigen, a *Toxoplasma*-neutralizing antibody test (Sabin & Ruchman) and a *Toxoplasma* complement-fixation test.

Treatment of Toxoplasmosis

Sulphadiazine and sulphamerazine are found to control the infection in animals and the successful treatment of a child has been reported. None of the modern antibiotics has proved effective. In spite of treatment pseudocysts may persist in the brain and possibly give rise to a relapse.

The account ends with a useful summary, in tabular form, of the findings described.

H E Shortt

CROCA J B & ANGSTADT L. The Inflammatory Reaction to *Toxoplasma* in the Omentum and Peritoneal Fluid of the Mouse. *Amer J Trop Med* 1949 July v 29 No 4 473-81 1 graph & 8 figs on 1 pl. (14 refs)

This is an account of the inflammatory reaction in the peritoneal cavity of mice after intraperitoneal inoculation of *Toxoplasma*.

The inoculum used was an "emu-wash" of infected mouse brain in Tyrode's solution.

Eighteen mice were infected and the findings in the peritoneal fluid and omentum recorded at intervals of 4, 8, 12, 24, 48 and 72 hours. The conclusions summarized below appear to have been based on this single experiment and no controls appear to have been used since examination of the peritoneal fluid and omentum of normal mice could hardly be so considered.

After four hours the inoculum had disappeared although rare free forms of *Toxoplasma* were seen then and at 8 hours. After 12 hours intracellular forms were seen in cells of the omentum while after 48 hours numerous free forms were seen both in omentum and in the peritoneal fluid. After 72 hours there was wide dissemination of parasites both in the omentum and in the peritoneal fluid which had increased in amount to 0.5 ml. H E Shaw

ENTOMOLOGY AND INSECTICIDES GENERAL

HOASTEIN M. Notes sur la biologie d'*Aedes aegypti* en Baso-Côte d'Ivoire. Biology of *Aedes aegypti* on the Ivory Coast. *Bull. Soc Path Ex* 1949 v 4, No 48 169-82.

This is a description of two kinds of breeding places of *Aedes aegypti* in the Ivory Coast—one is common between Abidjan and Grand Bassam and consists of thousands of abandoned coconut shells left on the ground in which the mosquito is able to achieve its life cycle from egg to adult in little more than a week. The water in some shells may contain as many as 400 larvae and pupae all of them *Aedes aegypti*. In this area adult mosquitoes invade the houses between 4 p.m. and 8 a.m.

The second area is in the forest region from Abidjan to Agboville and here the breeding places are formed in the piles of cocoa pods on the estates. The adult mosquitoes' behaviour is similar to that of those on the coast but they do not enter houses to the same extent and as they frequent the dense vegetation near the breeding places.

The paper contains a plea for some action to be taken to control these breeding places. H S Lucas

BICKER J C & TAYLOR Marjorie. Radiophosphorus and Radiostrontium in Mosquitoes. Preliminary Report. *Nature* 1949 Aug 5 164-7.

The authors have used radioactive isotopes of strontium and phosphorus administered to the larvae as means of marking adult mosquitoes and studying range of flight and length of life. The method to be preferred for marking adult mosquitoes with pigment and to use them (both isotopes are broken by larvae from the water in which they are living and can be traced later in the body and especially the legs) of the adult mosquitoes. At the concentration which suffices for marking, the animals are not toxic.

After technical development in the laboratory the method was applied to many thousands of adult *Aedes aegypti* which were released near Lagos it appears. Only a minute proportion were recovered (0.1 per cent) in the

largest experiment), [this is characteristic of all work done so far on marking mosquitoes, and makes one accept the results with slight hesitation] The maximum age among females at time of recovery was 28 days, among males a few days only. The maximum distance from point of release was 3,800 feet. The "mosquitoes were distributed largely by wind drift rather than their own flight, although the latter contributed" P A Buxton

FORBES, J & HORSEFALL, W R *Biology of a Pest Mosquito common in New Guinea* *Ann Entom Soc Amer* 1947, v 39, No 4, 602-6 [Summary taken from *Rev Applied Entom* Ser B 1949, July, v 37, Pt 7, 129-30]

Aedes scutellaris scutellaris, Wilk, is one of the most annoying pest mosquitoes in New Guinea and adjacent islands, where it is widely distributed. It is a sylvan species that is adaptable to domestic conditions. Small amounts of water in plant parts and in artificial containers are usual breeding places, and larvae were produced in large numbers in exposed supply and salvage dumps about army camps and once in bilge water in amphibious aircraft. Cartons contained a greater average number of larvae than metal containers, which varied in suitability. Those with lacquer linings were preferred to those without. Metal containers that had been blackened by burning were decidedly less attractive than others. Eggs were sometimes laid in a meniscus about emergent or floating objects or on moist surfaces above water level. Adults tended to remain near breeding-places. Marked females were collected 500 yards from the point of release, but it was observed in two different areas that females did not travel 800 yards in sufficient numbers to cause annoyance. Moderate breezes did not prevent feeding, but strong ones kept the mosquitoes from coming out.

The egg, larval and pupal stages occupied averages of 5, 5.2 and 2 days, respectively. The egg stage varied from 2 to 21 days when the eggs were kept in water continuously. One batch hatched in the laboratory after being kept for 61 days in a moist chamber before submersion. For eggs to remain viable for so long they must first have incubated on a wet surface long enough for the embryo to develop to the hatching stage. Some adults lived six weeks in the laboratory. The mean length of life of 33 females that had an opportunity to feed daily was 21.9 days. Pairing usually took place on the first or second day after emergence. The preoviposition period was about seven days but extended to 25 days in one case. Several batches of eggs may be laid by one female, and the mean number of eggs for caged females was 86.

SMITH, C N & BURNETT, D, Jr *Effectiveness of Repellents applied to Clothing for Protection against Salt-Marsh Mosquitoes* *J Econom Entom* 1949, June, v 42, No 3, 439-44

An account is given of tests made with approximately 3,400 compounds to assess their value as mosquito repellents when applied to clothing rather than to the skin.

Preliminary laboratory tests with *Aedes aegypti* showed that 900 of these compounds complied with the minimum requirements in screening tests, namely fewer than five bites in one minute's exposure daily for ten days. Of these, 375 were available in sufficient quantity for testing in the field where *Aedes taeniorhynchus* and sometimes *Aedes sollicitans* were numerous. The repellents were applied in acetone solution at the rate of 3 gm per square foot to stockings worn successively by three men for five minutes each.

The names are given of 230 of these compounds which were either ineffective or effective for named periods of less than 21 days, 92 substances were effective

for 21 days or longer and the results obtained with these are tabulated. In this table 18 compounds are indicated as being apparently safe for use on children and as being still effective after 24 hours of wear, but a warning is given that most of the substances require additional toxicological investigation before unrestricted use can be recommended. However three of them were of special interest because they are also effective when applied to the skin: these were methyl ester of monethyl oxide oxalic acid (Dulakone), propyl ester of N,N -diethylsorbicinnamic acid and ethyl ester of beta-phenyl- β -hydroxy propionic acid.
H. S. Lacey

FELLOWS, A. & DICKSON, P. Toxicité du S.N.P. sur les puces.
[Toxicity of S.N.P. for *legas ferrous*.] Bull Soc Path Exot. 1949, 42, Nos 5/6, 187-90.

S.N.P. is an abbreviation for N,N -diethyl- α -para-nitrophenyl. Some impurities with small numbers of ticks are reported. Used as a dust at 0.25 to 0.1 per cent and applied at 0.15 mgm. per sq. cm. S.N.P. killed all ticks in 48 hours.

An emulsion of S.N.P. sprayed on to ticks at 1 mgm. liquid per sq. cm. caused intoxication at all concentrations from 0.1 to 0.007 per cent, but the proportions which died over a period of four days were no better than in controls.
J. P. H. 1949

REPORTS SURVIVALS AND MISCELLANEOUS MATTERS

COLONIAL OFFICE. Annual Report on the East Africa High Commission for its Inaugural Year 1948. Colonial No. 913, 26 pp. 4s. 1949 London. H.M. Stationery Office (R.).

The East African High Commission was instituted to take the place of the pre-existing East African Governors Conference. It began to function on January 1, 1948. The Commission consists of the Governors of Kenya, Tanganyika and Uganda. It maintains its own Secretariat and it performs certain inter-territorial services. Among these are some which have bearing on medical matters, particularly the Research and Control Service. The Agriculture and Forestry Research Organisation has acquired large sites near Nairobi for laboratories and experiment stations, along with the Veterinary Research Organisation, and the Agricultural Research Institute at Arusha has been formally absorbed into it. The Veterinary Organisation has also undertaken research into the new drug, streptomycin.

The Tsetse Research Institute (Shinyanga), the Trypanosome Research Station (Tinde) and the East African Tsetse Acclimation Department have been merged into one organisation which will co-ordinate research on tsetse flies and trypanosomes and their control, and will apply the knowledge gained to practical problems. Certain work already done, referred to in confirmation that planned settlement is the real method of reclamation, is of interest because of the finding that *G. falki* can travel along water courses much further than had been expected, and that it can exist much further than known from permanent water.

The report is brief but informative. It will be interesting to see how this principle of inter-territorial co-operation expands in the future, and how vigorous an impetus this publication will give to the research which is so important a part of African development.
Charles H. Short

CONGO BELGE Direction Générale des Services Médicaux Rapport annuel 1948 [Annual Report of the Medical Directorate-General] 109 mimeographed pp, 2 folding maps & 3 charts

The title of the Annual Report on the Public Health in the Belgian Congo [this *Bulletin*, 1949, v 46, 415] has been changed in 1948 to that of Annual Report of the Medical Directorate-General but apart from a valuable introductory chapter summarizing events of special importance and an additional chapter giving a statistical statement of the health of the population, the layout follows in general that of previous reports

The Report contains the familiar detailed list of pestilential and infective diseases, descriptions of medical organizations, governmental and other, port, urban, industrial and general sanitation, and statistical appendices

In the introductory chapter, attention is drawn to the considerable extensions to the hospital organization which have been made or are in contemplation to discussions on closer medical cooperation with French Equatorial Africa, to the Inter-African Tsetse Bureau recently established in Léopoldville as a result of the Trypanosomiasis Conference in Brazzaville in 1948, to the campaign with DDT against the vectors of malaria and onchocerciasis to chemoprophylaxis of malaria, to the acquisition of large quantities of sulphones for trials in the treatment of some of the 60,000 leprosy cases in the Congo and to an intensification of the campaign against tuberculosis In connexion with the last-named subject an admirably realistic and cautious assessment of the problem is given BCG vaccination after Mantoux testing has been adopted and the Medical Department "avec plus de circonspection, malgré la vogue actuelle de la méthode," have turned towards mass radiography, bearing in mind its limited application to the primitive local conditions as compared with conditions in Europe and America It is maintained that this service should be ancillary to existing measures and should develop gradually with them pilot services, of the order of one per Province, will be contemplated in the first instance with the aim of gradual expansion One such post is already in operation and others are being established It is pointed out that the most difficult part of the problem is the treatment of actual cases of tuberculosis "Pneumology Services" are being developed in the principal hospital centres and will be developed as rapidly as possible

The details of diseases show in the main, no gross differences from those reported in 1947 The number of cases and deaths from plague were about halved two cases of yellow fever in Africans were reported from the Eastern Province There were 159 African and 98 European cases of epidemic typhus with three deaths among the former There were 30 European and 12 African cases of *fièvre rouge congolaise* There were 7 cases of sleeping sickness in Europeans with no deaths

A valuable feature of this section is the account of schistosomiasis to which more than two pages are devoted In Europeans there were 162 cases of rectal and 2 of vesical schistosomiasis recorded from the "postes fixes" in Africans, the corresponding figures were 8,374 and 787, with four deaths from each type It is stated that intestinal schistosomiasis is truly autochthonous, but that the vesical type is imported The disease is limited to certain provinces and the various foci therein are listed in considerable detail Reference is also made to additional local surveys, in particular in the fisheries around Lake Albert where 38 per cent of cases of intestinal schistosomiasis were found among some 15,000 people large-scale treatment with tartar emetic and anthiomaline was without incident small-scale trials of Miracid and Hexamidine are also

Book Reviews

46, No 12]

mentioned Chagas's disease naturally has a chapter to itself. Records are given from different States and measurements of endemicity by estimation of the parasitic index, diagnosis by direct blood-examination, by xeno-diagnosis and by animal inoculation, by fixation of complement and the precipitin reaction. Electrocardiography and viscerotomy are considered, and prophylaxis, general and individual. Other diseases discussed are amoebiasis, yaws, pinta, ankylostomiasis, schistosomiasis, filariasis, yellow fever, Rocky Mountain fever, for which a good scheme of inquiry has been organized in São Paulo for diagnosis by observation of suspected cases, collection of ticks in the dwellings and on animals, post mortem material from the heart and the results of liver and spleen puncture, preventive measures are detailed. Trachoma returns for 6 regions in São Paulo in 1938 are given, showing how much greater is the prevalence in rural than in urban schools. Thus, in Aracatuba 54 and 460, in Catanduba 107 and 710 respectively. The chief foci in Brazil are in Ceará, São Paulo and Rio Grande do Sul. *Pemphigus foliaceus*, *fogo selvagem* or "wild re" [see this *Bulletin*, 1946, v 43, 585, 1948, v 45, 464] whose aetiology is still unknown, and various mycoses end this section of the book.

Part III comprises three chapters. In the first the problem of Organization is stated and in the second the difficulties, the chief being the scattered character of the rural population, economic factors particularly the low state of living and general ignorance, deficient data on the epidemiology of rural diseases, the scarcity of men with special knowledge of rural districts—malariaologists, epidemiologists, dentists, sanitary engineers, nurses, etc. In the final chapter proposals for organization of a rural hygiene service are put forward, to include propaganda, education of adults as well as children in health principles, provision of more doctors, health clinics and mutual help in outbreaks, maternity and child-welfare departments, health centres to change the habits and customs if they are insanitary, and to inculcate sounder measures and cure disease.

It will be seen from the foregoing account that much of the information in this book is of local interest, at the same time much that is useful and could be applied in other rural areas can be gathered by careful reading of the work which must be looked upon as a book *suu generis*, almost a pioneer work the composition of which must as we said at the outset, have entailed much labour.

H Harold Scott

LEVI CASTILLO Roberto Atlas de los anofelinos Sudamericanos [Atlas of South American Anophelines] 206 pp, 1 map & 354 figs on 52 pls 1949 Guayaquil Ecuador Tip de la Sociedad Filantrópica del Guayas

Professor Buxton, reviewing a paper by SENFVET [this *Bulletin*, 1948, v 45 1051], has drawn attention to the unsatisfactory state of Anopheline taxonomy in South America. This book does little to improve matters. Many will no doubt wish to use it to supplement the useful keys to larvae and female adults compiled by RUSSELL ROZEBOOM and STONE [this *Bulletin*, 1944, v 41, 325] but they should do so with caution. The author has added keys to eggs and male terminalia and has included certain additional species, most of them described since the publication of the earlier keys. These are —

Culiseta rozeboomi Causey Deane & Deane 1945 and *Anopheles chiriquiensis* Knapp 1946, *Toxorhynchites* Del Ponte & Heredia, 1945 *durlani* Causey, 1945 *heredii* Galvão & Damasceno, 1944, *galao* Causey, Deane & Deane 1943 *laevis* Correa & Cerqueira, 1944, *okloratras* Osorno Mesa, 1947, *canonii* Loch & Abonnenc, 1945, and *costalimai* (Fonseca & Ramos)

eggs and young of birds hibernate in holes in trees and in the ground Where numerous can be a pest in orchards Were regarded as a delicacy by the Romans who fattened them in cages 3-7 young at a birth Introduced in recent years to Buckinghamshire, where they are reported to be spreading, known to local residents as 'Spanish Rats' *Glis glis*"

The author does not necessarily confine himself to the bare minimum, the annotations contain many interesting observations In a few words is told the tragedy of the Norway Lemmings which swarm in certain years, overrun the lowlands and perish in vast numbers in the fjords and sea beyond Then no one can fail to be interested in the story of the domestication of the horse from three centres, one Indo German or Aryan dating from 3000 B.C. originating perhaps in Southern Russia, the second derived from the Western European wild horse giving rise to draught horses and the third the Mongolian stock That does not conclude the information about the horse because different breeds such as Arabs, Barb, etc., are treated separately in annotations of their own The animal kingdom possesses so many curious features, that there is a surprise on almost every page of this book who knows that the sloth derives its protective coloration from the blue and green algae lining the grooves in the hairs, or that the danger signal to a herd of springbok is given by the buck making 10 vertical leaps into the air, with eversion of its dorsal gland?

There are many examples of animals nearly becoming extinct and which have yet just managed to survive by man's intervention One of the most interesting is the case of Père David's deer, a peculiar antelope now unknown in the wild state but originally preserved in the summer palace at Peking The herd was exterminated during the Boxer rising, but by a lucky chance just before this episode some specimens had been sent to Europe and their descendants still survive in the park of Woburn Abbey

The encyclopaedia is illustrated by not very well produced monochrome pictures These could be multiplied with advantage and it would be more useful to have drawings of the rarer animals rather than the tiger or the porcupine

This encyclopaedia might well be called the Baedeker of the Zoo where it would be an ideal companion Apart from the general features the text seems to devote an abnormal amount of attention to the fur trade, there is hardly a page which does not include information about the number of pelts produced annually or the trade names etc This seems a little irrelevant, and a medical reader would welcome the substitution of information regarding zoonosis or the animal reservoirs of disease In only about one instance is this mentioned at present in the case of plague and rats The work would have a greater value to medical readers if the disease-reservoir potentialities had been noted for each animal but perhaps this is too much to hope for In the meantime it can be kept on the shelf of the medical worker ready to consult either for verifying a Latin name or for learning a little about the habits of some animal carrier of disease

P. C. C. Garrlam

the book is 40 pages including 18 pages of text and a table of contents. The historical chapter consists of a number of interesting pieces of information not likely to be met with in the standard text on typhoid fever.

The authors mention that the tick borne typhus of England called by the French *la fièvre des moutons* cannot be distinguished exactly from typhus by louse-bites, and mention a method which they recommended for the early diagnosis of the typhoid fevers.

Although there is a brief description of murine typhus the only reference to the tick borne diseases is the one mentioned above. J. H. B. D. MEYER.

Dr. H. Albert, M.D., Director of the Institute of Tropical Medicine, Liverpool, has revised, with Dr. Louis M.D., D.Sc., etc., *Diseases of the Warm Climates, Their Clinical Features, Diagnosis and Treatment*, pp. xv + 415, 21 charts & 100 figs., 1948. London: William Heinemann—Medical Books Ltd., 99 Great Russell Street, W.C.1. 4s.

This is the promised limited version referred to in the review of the book originally published in French this *Bulletin*, 1949 v. 48, 241.

It is excellently printed and illustrated on art paper and fulfils the English reader all the promises of the original production in French.

The English edition contains a foreword by Dr. Walter A. Sawyer.

H. J. O'D. H. McGalivray

INDEX OF AUTHORS OR SOURCES

(The bracketed abbreviations after the page numbers indicate the subjects
Page numbers within brackets indicate papers not summarized.)

Am	signifies	Amoebiasis and Intestinal Protozoal Infections	Lep	signifies	Leprosy
Bart	"	Bartonellosis	Mal	"	Malaria.
Bl.	"	Blackwater Fever	Misc. Dis	"	Miscellaneous Diseases
B.R.	"	Book Review	Oph	"	Tropical Ophthalmology
Chl.	"	Cholera.	Pl.	"	Plague.
Def Dis	"	Deficiency Diseases	Prot	"	General Protozoology
Den	"	Dengue and Allied Fevers	Rab	"	Rabies
Der	"	Dermatology and Fungus Diseases	R.F.	"	Relapsing Fever and other Spirochaetoses
Ent	"	General Entomology and Insecticides	Reports, etc	"	Reports, Surveys and Mis- cellaneous Papers
Ep Dropsy	"	Epidemic Dropsy	Sp	"	Sprue
Haem	"	Haematology	Tryp	"	Trypanosomiasis
Heat Str	"	Heat Stroke and Allied Con- ditions	Typh	"	Fevers of the Typhus Group
Hel	"	Helminthiasis	Ulc.	"	Tropical Ulcer
Lab	"	Laboratory Procedures	Vms	"	Venoms and Antivenenes
Leish	"	Leishmaniasis	Y F	"	Yellow Fever
			Ys	"	Yaws

A

- Abalos, J W, 967 (Vms)
 —, with Romafia 535 (Tryp) 569 (Vms),
 583 (Ent)
 Abbott, P H, 705 (Mal)
 Abbott R T, 558 (Hel)
 Abdel Azim M & Barlow, C H, 150 (Hel)
 —, with Watson & Halawani, (380) (Hel)
 Abdel Aziz, A, with Halawani & Ashour (355)
 (Y F)
 Abdou S & Grace H K, 269 (Hel)
 Abouneene, E., (582) (Ent)
 —, with Camain, (582) (Ent)
 —, with Caubet, René-Boisneuf & Louis-
 Sidney 318 (Mal)
 — & Chassignet, R., (94) (Ent)
 —, with Floch, (94) *bis* (582) (Ent) (924)
 (Tryp), (1008) (Mal)
 Acevedo, C E with Rodriguez Molina, Lang
 Jimenez-Torres & Diaz, 558 (Hel)
 Acheson R M with King & Spensley (114)
 (Mal)
 Acosta-Matienzo J with Maldonado 377
 (Hel)
 Ada G & Fulton J D, 925 (Leish)
 Adams A. R D & Seaton, D R, 936 (Am)
 Adamson H, with Brownine & Calver (126)
 (Tryp)
 Adamson, P B 781 (Ulc.)
 Adelman R J with Kassin 519 (Mal)
 Adler S & Zuckerman A. 449 (Leish)
 African Affairs 178 (Reports etc.)
 Afridi M K & Singh D 17 (Mal)
 Afrika 594 (B R)
 Afrique Occidentale Française 416 1095
 (Reports etc)
 Agostinucci G., with Biocca & Bronzini 179
 (Reports, etc.)
- Agricola E., 680 (B R)
 Aguilar Rivas A with Zuniga 6 (Mal)
 Ahmad, M U, 35 (Pl)
 Ahuja, M L & Brooks A. G 775, 867
 (Vms)
 — & Gurmipal Singh 38 (Chl)
 —, with Shrivastava & Singh 827 (Chl)
 Aikawa, J K., with Harrell, 724 (Typh)
 Ainley, A D Curd F H S & Rose F L
 (522) (Mal)
 — & Sexton, W A (412) (Ent)
 Aizemberg, M with Borzone & Lapieza
 Cabral 1132 (Tryp)
 Akima T., with Magara Go & So 782 (Ulc.)
 Akle Delgadillo J & Pérez Rebelo R, 625
 (Typh)
 Alain M, Massal E Touzin R & Porte, L,
 1037 (Am.)
 — Saint-Etienne J & Reynes V., 971
 (Misc Dis.)
 Alakia O B 497 (Heat Str)
 Alberto Alvarado C (501) (Ent)
 Albornoza Plata A 1055 (Hel)
 Albou with Benhamou & Leonardon 903
 (Mal)
 Alburn H E. with Ehrich Seifter & Begany,
 487 (Hel)
 Alderson S 265 (Lep)
 Alexa I with Cuca Duport & Athanasia
 1115 (Mal)
 Alexio H B., with Costa 149 (Lep)
 Alexio J & Furtado T A 283 (Der)
 Ali Al Hamami, with Watson 846 (Hel)
 Alicata J E. & Burr G O 962 (Hel)
 Allan W with Trapnell & Martin 100
 (Reports, etc.)
 Allen R M 778 (Der)

Auffret, C, with Jonchere & Raoult, 528 (Bl)
 —, with Raoult, Tanguy & Martin 913 (Bl)
 — & Tanguy, F, 964 *bis* (Def Dis)
 Augustine, D L, with Gordon 572 (Misc Dis)
 Aujoulat, L, 990 (BR)
 Austin, C J, 638 (Lep)
 Austoni, M & Bovo, G, 1148 (Am)
 Autheman, R, with Brisou & Castet, 523 (Mal)
 Ayyad, N, with Azim, 646 (Hel)
 Ayyar, S R, 784 (Misc Dis)
 Ayub, V, & Pérez, J, (256) (Pl)
 de Azevedo, J F, with da Fonseca, 62 (Hel)
 —, Roque, R de A, Colaço, A, Cristino, E, Rés, J F & Coelho, M F, 1062 (Hel)
 —, da Silva, J B, Coito, A de M, Coelho, M F & Colaço, A, 1056 (Hel)
 Azim, M A, & Ayyad, N, 646 (Hel)
 — & Watson, J M, 946 (Hel)
 —, with —, 948 (Hel)
 Aziz, M, 16 (Mal)
 —, with Shelley 807 (Mal)

B

Babiet J with Deschiens 65 (Hel)
 Babudieri B & Boccarelli, D, 835 (RF)
 Bach, L G with Foy, Kondi, Damkas, Depanian Lescopoulou, Dax, Pitchford, Shiele & Langton, 316 (Mal)
 Baegalupo, J 334 (Mal)
 Baer, J G, with Joyeux, 951 (Hel)
 —, Kouri, P & Sotolongo, F, 952 (Hel)
 Bahmanyar M with Baltazard, 25 (Typh)
 —, with — & Mofidi 43 44 (RF)
 —, with — Seydian & Mofidi, 836 (RF)
 Bailenger J, with Pautrizel, 653 (Hel)
 Bailey, C A, Diercks F H & Proffit, J E 348 (Typh)
 Bailly J with Remlinger 356 (Rab)
 Baker R H with Downs 673 (Ent)
 Balasubrahmanyam M with Gault, 484 (Hel)
 Baldi A & Del Giudice, V 434 (Mal)
 Baldwin E, and Moyle V (854) (Hel)
 Baliff L. *see* Ballif L
 Ball E G McKee R W, Anfinson, C B, Cruz W O & Geiman, Q M 117 (Mal)
 Ball G H 18 (Mal)
 Ballif, L with Ciuca, Chelaresco Constantinesco & Timisescu 321, 329 (Mal)
 —, with —, Vrabie & Munteanu-Vasilu 322 (Mal)
 Balozet, L. 42 (RF)
 Baltazard M & Bahmanyar M 25 (Typh)
 —, — & Mofidi C 43 (RF)
 —, Mofidi S & Bahmanyar, M 44 (RF)
 — Seydian B Mofidi C & Bahmanyar M 836 (RF)
 Balceanu I Constantinesco N & Toma A (1140) (Rab)
 — Russ M & Voiculescu M, 837 (RF)
 — Voiculescu M & Russ, M, 837 (RF)
 Balzar, M 427 (Mal)
 Banu H L. (115) (Mal)
 — & Guha P C. (806) *bis* (Mal)
 — Iyer B H & Guha P C (114) *ter* (115) (Mal)

Bang, F B, with Papirmeister, 55 (Hel)
 Barakat, M R & Smith, D A., 962 (Def Dis)
 Baranger P & Filer, M K., 446 (Mal)
 Barber, C H, 1190 (Reports, etc)
 Barboza, A (413) (Lab)
 Baribeau, B J, with Kahn & Villalon, 944 (Lep)
 Barksdale, W L & Routh, C F, 261 (Am)
 Barlovatz, A., 459 (Den)
 Barlow, C H, 752 (946) (Hel)
 —, with Abdel Azim, 150 (Hel)
 —, & Meleney, H E 553 (Hel)
 Barnes, A C, 129 (Typh)
 Barnes, G T, 392 (Haem)
 Barrett, R H, 1091 (Reports, etc)
 Barrientos, E, with Reyes, Rodriguez, Carranza Amaya & Peralta, 639 (Lep)
 de Barros L C 1130 (Tryp)
 Barsky, S, with Cornbleet & Schorr 865 (Haem)
 Bartgis, I L, with Reardon, 828 (Am)
 Basnuevo, J G, 388 (Hel)
 — & Gutiérrez Estaril, E, 1036 (Am)
 Bass H E Schomer, A & Berke, R, 780 968 (Der)
 Bassères, M S, with da Costa, 330 (Mal)
 Bassi, G, 657 (Def Dis)
 Bates M & de Zulueta J, 698 (Mal)
 — with — 517 (Mal)
 Batson H C. with Gauld Schlingman Jackson Manning & Campbell 826 (Chl)
 Battelli C 1161 (Hel)
 Battersby A R & Openshaw H T (940) *bis* (Am)
 Bauer J L. with Berk & Castle 165 (Haem)
 Baum F L, 1176 (Oph)
 Bruman P M Bennett, H J & Ingalls J W Jr 270 (Hel)
 — with Ingalls Hunter & McMullen 950 (Hel)
 Baumann H with Schwetz & Fort 897 (Mal)
 Bayles A with Thompson Bush & Lillgren 446 (Mal)
 Baylis H A., 952 (Hel)
 Baz I with Halawani Hafez & Shawarbi 650 (Hel)
 — with — & Morcos 435 (Mal)
 Beach, E W 155 (Hel)
 Beaumont J W L with Lees (94) (Ent)
 Bean, W B Vilter, R W & Blankenhorn M A 1072 (Def Dis)
 — with — & Mueller 658 (Def Dis)
 Beard R R with Smith & Saito 495 (Der)
 — with — Rosenberger & Whiting 1172 (Der)
 Beaudiment, R Brochen L & Peuziat Y 918 (Tryp)
 Beaver P C 953 (Hel)
 — & Deschamps G 829 830 (Am)
 Beechell L M & Rotberg A 370 (372) *bis* 1140 (Lep)
 — with — 371 (372) *bis* (Lep) 678 (BR)
 — & Maurino F 678 (BR)
 — with de Souza Campos 681 682 (BR)
 — with — & Rotberg, 678 (BR)

- Blair D M with Goodfille 55 (Hel)
--- Hawking F Meester C V & Ross
W J 848 (Hel)
--- Loveridge I G Meester C V & Ross
W F, 556 (Hel)
--- with Meester & Ross 1153 (Hel)
--- & Bruneau J 822 (Typh)
--- & Hintermann J (875) (Prot)
Blanc G 461 (Pl)
--- & Maurice A 836 (RF)
Blanchon P., with Furiaf & Cabail 1183
(Misc Dis)
Blanco I L & Fite G L 943 (Lep)
Blankenhorn M A, with Bern & Vilter 1072
(Def Dis)
Blanton F S with Travis Gjullin Smith &
Wilson (1088) (Ent)
Blas Ruiz H, Gruhn F & Schouten G 362
(Am)
Bliznick A with Brackett 751 (Hel)
Bloch F H with Knisely Eliot & Warner 12
(Mal)
Boecarelle with Bahudieri 835 (RF)
Bock M & Kikuth W 540 (Typh)
de Boer F 139 (Rab)
Bohart R M 412 591 /ic (Ent)
Boiron H 1046 1047 /is 1048 (RI)
Bolvin 1181 (Ulc)
Bondi A Jr with Janton & Sigel 455 (Typh)
Boncardo A with Previtera 128 (Leish)
Bonilla Najar A & Gomez Vargas M 642
(Hel)
Bonre C Bras G & Lie Kian Joe 63 (Hel)
--- with Faust 59 (Hel)
Bonrecarrere E A & Ardor R., (1161) (Hel)
Bonnani H & Moretti G F (771) (Sp)
von Bonndorff B, 154 (Hel)
Bonsib P S (1076) (Vms)
Boquet P & Ichoult Y 392 (Vms)
Botrotchin M with Pellegrino 620 (Trip)
Botrone K A (714) (Trip)
--- Lapaza Cabral P & Auzemberg M
1112 (Trip)
Howardi T & Corsi C 513 (Mal)
Boe H N & Chakraborty D C 827 (Chl)
Boe P N with Krishnan Smith Neogy Roy
& Ghosh 719 721 /ic (Typh)
Bowck W with Anderson Johnstone Peña
Chevrea & Pacler 1146 (Am)
Boye A with Combescio Dumitresco
Sund & Cuireza & Zarnea 931 (Typh)
--- with --- Popesco Panai
Iscovescu 923 (Typh)
--- with --- & Zarnea 931
(Typh)
Boyche with Bray (117) (H)
Boydall M R & Snyder J C 927 (Typh)
Boyer K 1002 (Mal)
Boyo G with Antton 1145 (Am)
Boys A G 92 (Typh)
Boyle J A 25 (Hel)
Boydell I with Greenberg & Josephson 110
(Mal)
Boydell J A 25 (Hel)
Boydell J A & Cohen D 25 (Mal)
Boydell J A & Cohen D 25 (Hel)
Boydell J A & Cohen D 25 (Hel)
Boydell J A & Cohen D 25 (Hel)
- Bramham S E with Stitt, Clough & contribu-
tors 185 (BR)
Brannon M J C & Faust E C 955 (Hel)
Bras G with Bonne & Lie Kian Joe 63 (Hel)
---, Rijkheüsch L Kotter, G F & Ham
D L (869) (Der)
Braun Blanquet M 954 (Hel)
de Brauwere, P 785 (Reports etc.) 913
(Tryp)
Breed, R S Murray E G D & Hitchens
A P 188 (BR)
Breindl V & Komárek J 800 (Mal)
Brennan J M (410) (Ent)
Briceño-Iragorry, L., 718 (Typh)
Briceño Rossi, A L 494 (Der)
Briney A K., with Taylor 1080 (Der)
Brinkmann E., (340) (Leish)
Brisou (583) (Ent)
--- Castet A & Autheman R 523 (Mal)
British Commonwealth Collection of Micro
Organisms 981 (Reports etc.)
British Med J, 327 (Mal) 920 (Tryp)
Briz de Negroni, C. with Negroni 1175 (Der)
--- with --- & Daglio 1671 1175 (Der)
Brochen, L., with Beaudiment & Peuzant 918
(Tryp)
Bronzini E. with Biocca & Agostinucci 179
(Reports etc.)
Brooke M M Donaldson A W & Mitchell
R B 1071 (Hel)
Brookman B with Reeves & Hammon, 173
(Ent)
Brooks A G with Ahuja, 775 867 (Vms)
Brooks T J Jr Ward J W & Holder T M
488 (Hel)
Broughton N., Ogilvie A C I & Walie
W D 939 (Am)
Brown G 1109 (Mal)
--- with Gallui 935 (Chl)
--- & Maroun T 933 (Chl)
Brown D C, Knight, L. A & Jellison W I
352 (Typh)
Brown H E. with Derrick 930 (Typh)
Brown H W with Theiford Otto & Maren
68 (Hel)
--- & Williams, R W 1066 (Hel)
Brown J H 142 (Pl)
Brown M Cronk B de Sinner F Green
J F Gibbons J E. & Kuusinen Ekbaum E.
(455) (Hel)
--- Sinclair R G Cronk L B & Clark
G C with Kuusinen Ekbaum I 376 (Hel)
Browning C H Culver K M & Adamson
H (126) (Tryp)
Browning H C Traver F C Shapiro S K.
Gluckman I & Dubrule M (410) (Ent)
--- & Kalra S L 722 (Typh)
--- Shapiro S K & Dubrule M (410)
(Ent)
Bruckner S & Leutenants 933 (Mal)
Brum L 355 (Hel)
Brump L C 92 (Mal) (1088) (H-1)
Brum-Brown P 238 (Tryp)
--- Dalle J. Paul I & Carile J 123
(Tryp)
Brucard J with Blane 822 (Typh)
Brucard & Brucard (370) (H-1)
Brucard M S with Rev. Schoenbach Buve
F & Wehrer 350 (Tryp)

- Jastle, W B, with Berk & Bauer, 165 (Haem)
 —, with Daland, 492 (Haem)
 —, with Shen & Fleming 1074 (Haem)
 le Castro, J C R, 370 (Lep)
 Castro Cerqueira, G de, with Souza Lima 372 (Lep)
 Castro Jenkins A, (153) (Hel)
 —, with Peña Chavarria, Ovaras Arias, Romero López & Fallas Diaz 342 (Leish)
 Cattán R Frumusan P & Cousin R, 486 (Hel)
 Caubarrere N L, with Arana Iñiguez & Garcia Capurro, (382) (Hel)
 Caubet, P, Abonnenc E, René Boisneuf P & Louis-Sidney, 318 (Mal)
 Caughey J E 932 (Typh)
 Causey, O R with Deane & Deane, 319 (Mal)
 Cavallade C N G (1166) (Def Dis)
 Cawley E P 1079 (Der)
 Cawston, F G, 59, 647 (Hel)
 Ceccaldi J, Trinquier, E Arnoult, H & Pellissier, A, 967 (Vms)
 Celis, H, with Gahan & Downs, 1119 (Mal)
 Celis Pérez, A, with Potenza, 284 (Der)
 Cerdán Alfonso J E, (485) (Hel)
 Cerabona, M 519 (Mal)
 Cerdán Murrieta, L, with Bustos Castellanos, Lassman & Ortiz, 898 (Mal)
 Chadwick, L E & Dethier, V G, 404 (Ent)
 — with —, 404 (Ent)
 Chaffee, E F with Larsh, 469 (Am)
 Chakrabarty, R (561) (Hel)
 Chakrabarty, D C with Bose 827 (Chl)
 Chakravarti H, with Chaudhuri 325 (Mal), 718 (Typh)
 Chakravarty, N K., with Chaudhuri & Rai Chaudhuri 610 (Mal)
 Chalmers, T C, Jr (212) (Mal)
 Chan, E, 658 (Oph)
 Chance M R A & Dirnhuber, P, (486) (Hel)
 —, & Mansour T E, 760 (Hel)
 Chand, A., Gupta D C & Chhuttani P N, 126 (Leish)
 Chang, A, with Chung Lim, Wang & Koeh, 434 (Mal)
 Chang, F C, with Fieser, Dauben Heidelberg Heymann & Seligman, (115) (Mal)
 Chang, H, with Ke & Liu, 26 (Typh)
 —, with Liu & Wang, 24 (452) (Typh)
 Chang, K., Tong, W H. Chin, H T & Li, C. H (466) (Am)
 Chang, N C 716 (Typh)
 — with Zia 346 (Typh)
 Chang S L. 1031 (Am)
 Chang T -H Smith G W, Riesenman, F R & Alston, E. F, 378 (Hel)
 Chang Chiang E with Kuo Shao Chou & Yui Huan Wen, 647 (Hel)
 Changus G W, with Carrera 144 (Am)
 Chao, H, with Yi Chow & Liu 489 (Def Dis)
 Chartres, A with Favarel & Carnière (255) (Pl)
 Chassignet, R with Abonnenc, (94) (Ent)
 — with Floch (94) (Ent)
 Chatterjee, J R, with Gupta, (815) (Leish)
 Chatterjee S N, 553 (Lep)
 — & Dharmendra, 668 (Oph)
 Chaudhuri, R N & Chakravarti, H, 325 (Mal) 718 (Typh)
 —, Rai Chaudhuri, M N & Chakravarty, N K, 610 (Mal)
 Chaussinand, R, (147), (369), 1052 (Lep)
 —, Paris, C. & Crougue, O, 372, 375 (Lep)
 Chelaresco M, with Ciuca, Ballif, Constantinesco & Timisescu, 321 (Mal)
 —, with —, Timisescu, Vasiliu Munteanu & Trofin, 329 (Mal)
 —, with —, Ballif, Vrabie & Munteanu-Vasiliu, 322 (Mal)
 Chen, H H, with Sprent, (854) (Hel)
 Chen, H T, 1070 (Hel)
 Chen, K K, with Henderson, Rose & Harri 614 (Mal)
 Chen, T H, 358, 1143 (Pl)
 Chen-Jen, C & Zia, S H, 140 (Rab)
 Chesterman C C, 57 (Hel) 768 (Def Dis)
 Chavez Zamora, A with Latapi, 1053 (Lep)
 Chevrot, L, with Raynaud & Miniconi, 902 bis (Mal)
 Chhuttani, P N, 771 (Haem)
 —, with Chand & Gupta, 126 (Leish)
 — with Taylor & Kumar, 771 (Haem)
 Chi, H, 668 (Oph)
 Chin, H T, with Chang, Tong & Li, (466) (Am)
 Chiyuto, S, (480) bis (Lep)
 Choa, G H, with Kiang, 746 (Lep)
 Chopra, B L, (877) (Ent)
 Chou, T C & Jang, C S 366 (Am)
 Choussat, H, with Lebon & Choussat-Clausse (520) (Mal)
 Choussat Clausse J, with Lebon & Choussat (520) (Mal)
 Chover Madramany, P 844 (Lep)
 Chow, H, with Chung & Lu, 341 (Leish)
 Chow, Y, with Yi, Chao & Liu, 489 (Def Dis)
 Christensen, W R 85 (Heat Str)
 Christoffersen, N R & Heintzelmann, F (77) (Sp)
 Chung, H, Lim, K T, Chang, A, Wang, W P & Koeh, Z S, 434 (Mal)
 Chung H-L, Chow, H-K. & Lu, J-P, 341 (Leish)
 Chwatt, L J (823) (Y F), 1117 (Mal)
 Chwatt, L J, with Gordon & Jones, 563 (Hel)
 Ciaccio, G, 451 (Typh)
 —, with Giroud, 539, 625, 717 (Typh)
 —, with — & Vargues, 717 (Typh)
 Ciferri, R with Redaelli, 281 (Der)
 Ciuca, M, Alexa I, Dupont, M & Athanasiu, M, 1115 (Mal)
 — Ballif L, Chelaresco, M, Constantinesco C & Timisescu, A, 321 (Mal)
 —, —, — & Timisescu, A., Vasiliu-Munteanu, F & Trofin, M V, 329 (Mal)
 —, —, —, Vrabie M & Munteanu-Vasiliu, F., 322 (Mal)
 —, Soflete, A. Constantinesco, P & Teriteanu, N, 324 (Mal)
 Ciurea V., with Combesco, Dumitresco, Sturdza, Botez & Zarnea, 931 (Typh)

- Jorcos, A., with Dana & Sebag, 341 (Leish)
 Jordero, A. A., with Quiroga & Negroni, 168 (Der)
 Jordero Moreno, R., with Ríquez-Iribarren & Anduze, 1082 (Oph)
 Jorkill, N. L., 21, 22 (Leish), 388, 767 (Def Dis), 866 (Vms)
 —, Creditor, H & Stewart, G E S, 74, 75 (Def Dis)
 Jorbleet, T., Schorr, H C & Barsky, S, 865 (Haem)
 Jornero, A., 1017 (Tryp)
 Jorradetti, A., 12 (Mal), 1020, 1134 (Leish), 1027 (Bart.)
 Jorsl, C., with Boscardi, 513 (Mal)
 Josa Costa, A. M & Bassères, M S, 330 (Mal)
 Josta, D, 1073 (Def Dis)
 Jda Costa, F C, with de Arruda, Nahas & Rosenfeld, 816 (Leish)
 Costa, L P, with di Pietro & Niño, 968 (Der)
 Costa, O G & Alexio, H B, 149 (Lep)
 Costhuizen, S F, 839 (Ys)
 Cotaesco Manculesco E, with Cornhiesco & Dumitresco, 928 (Typh)
 Cotthill, C W, with Farmer, 1035 (Am)
 Couceiro, A., 1059 (Hel)
 Coudert, J & Juttin, P, 976 (Lab)
 Coulston, F, 1009 (Mal)
 — & Huff C. G., 106 (Mal)
 —, with Hugg, 104 (Mal)
 Courtois, C, with Liegeois & Rousseau, 136 (YF)
 Cousin, R, with Cattan & Frumusan, 486 (Hel)
 Coutelen, F, Biguet, J & Cochet, G, (146) ter, (549), 637 (Am)
 —, Cochet, G & Biguet, J, 571 (Der), 941 (Am), 951 (Hel)
 Coutinho, J O & Pessôa, S B, 1058 (Hel)
 Cova Garcia P, 210 (Mal)
 Covell G, 327 (Mal)
 —, Nicol, W D, Shute, P G & Maryon, M 325 437 703 (Mal)
 Cowper, S G, 265 (Hel)
 — with Halawani Hafez & Newsome, 753 (Hel)
 Cox H R, with Fox, Rickard & van der Scheer 819 (Typh)
 —, with Koprowski 253, 1140 (Rab)
 Coxon, R V 466 (Am)
 Crawford, J N & Reid, J A G, 71 (Def Dis)
 Crawford R P with Scott & Jenkins 775 (Haem)
 Creditor H with Corkill & Stewart, 74 75 (Def Dis)
 Crewe W with Gordon, 514 (Mal)
 Cristino E with de Azevedo, Roque, Colaço, Rés & Coelho, 1062 (Haem)
 Criswell, R H with Hand, 765 (Hel)
 Critchley, C F, 42 (Am)
 Crivellari C A & Martín Mendy, R (1062) (Hel)
 Crofton H D (66) bis (Hel)
 Crofts P C, with Bennett & Hey, (522) (Mal)
 Cronk B, with Brown & Sinner Green Gibbons & Kuitunen-Ekbaum, (488) (Hel)
 Cronk L B with Brown, Sinclair, Clark & Kuitunen Ekbaum, 376 (Hel)
 Crosnier, with Lavier & Merle, 469 (Am)
 Crosnier, J, with Siguer & Piette, 1037 (Am)
 —, with — & Sapin Jaloustre, (744) (Am)
 Crosnier, R Bernier, G, Molinier, A Besseige H & Lefebvre P, 743 (Am)
 —, with Lavier & Merle, 365 (Am)
 —, Merle, F & Tabuse, L, 695 (Mal)
 Cross H F, with McDuffie, Sharp, Twinn & Wilson, (1088) (Ent)
 — & Snyder F M, 540 bis, 820 (Typh)
 —, with —, 540 (Typh)
 — with Twinn, Hocking & McDuffie, 580 (Ent)
 Cross, J B & Anigstein, L, 92, 1186 (Prot)
 Crougue O, with Chaussinand & Paris, 372, 375 (Lep)
 Crowden G P, 497 (Heat Str)
 Crowther, A F with Ashworth, Curd Hendry, Richardson & Rose, (611) (Mal)
 — Curd, F H S & Davey, D G & Stacey, G J, (907) (Mal)
 —, Richardson, D N & Rose, F L, (216) (Mal)
 Cruickshank, J C, 1085 (Misc Dis)
 Cruise, A B, with Smadel & Jackson, 1025 (Typh)
 Crusz, H, 65 (Hel)
 Cruz, J R, Guytingeo A & Kasilag, W R, 954 (Hel)
 Cruz, W O, with Ball, McKee, Anfinen & Geiman, 117 (Mal)
 Cseh Firtos, S, 1108 (Mal)
 —, with de Jong, (94) (Ent)
 Culbertson, C G, with Dublin & Friedman, 396 (Der)
 Culp, F B, with McCord, Kelley & Switzer, 280 (Haem)
 Culwell, W B Cooper, W C, White, W C, Lints, H A & Coatney, G R, 905 (Mal)
 —, with White, Cooper, Coatney, Lints & Young 906 (Mal)
 Culwick, A T with Fairbairn, 812 (Tryp)
 —, with Ford & Whiteside, 122 (Tryp)
 Cunha, R A, (368) bis (369) (Lep)
 Curd, F H S, with Ainley & Rose, (522) (Mal)
 — with Ashworth, Crowther, Hendry, Richardson & Rose, (611) (Mal)
 —, with Birtwell, Hendry & Rose, (216) (Mal)
 —, with Crowther Davey & Stacey, (907) (Mal)
 — with —, Richardson & Rose, (216) (Mal)
 — & Davey D G, 338 (Tryp)
 —, Davey & Stacey G J, (907) (Mal)
 —, Hendry, J A. Kenny, T S, Murray, A G & Rose, F L, (215) (Mal)
 —, Hoggarth E., Landquist, J K & Rose F L, (329) (Mal)
 — Landquist, J K & Rose, F L, (329) (Mal)
 Cymerman, J & Short W F, (706) (Mal)

P

- [illegible]

- Dimitriu, A., with Zaharia, 928 (Typh)
 Dimiz, O., with Stancioli, 944 (Lep)
 Dimhuber, P., with Chance, (486) (Hel)
 Dixon, J. L., with Ochsner & DeBakey, 955 (Hel)
 Doeleman, H. & van Thiel, P. H., 314 (Mal)
 Dold, H. & Themme, H., 761 (Hel)
 Doll, R. & Schneider, R., 326 (Mal)
 Donaldson, A. W., with Brooke & Mitchell, 1071 (Hel)
 Donaldson, R., with King, Wootton, Sisson & Macfarlane 663 (Haem)
 Donoso Barros, R. 394 1169 (Vms), 1087 (Ent)
 Do Prado, F. C., 364, 940 (Am)
 Dostrovsky, A. & Sagher, R., 868 (Der)
 Doucet, G., 214 (Mal)
 Doucet, J., with Grenier, (1088) (Ent)
 Douglas B. & Kermack, W. O., (806) (Mal)
 Dounet, G., with Bernard & Jaujou, 736 (Pl)
 Dove, W. E., with Sarles & Moore (584) (Ent)
 Dowding, E. S., 395 (Der)
 Downie, G. L., (461) (Pl)
 Downs, W. G. & Baker, R. H., 673 (Ent)
 —, Colorado Iris, R. & Gahan, J. B. 614 (Mal)
 —, with Gahan & Celis, 1119 (Mal)
 Doxiades, T. & Tiliakos M. 164 (Def Dis)
 Drake N. L., Hayes, R. A., Garman, J. A., Johnson R. B., Kelley, G. W. Melamed, S. & Peck, R. M., (611) (Mal)
 Dreguss, M. & Farkas E., 345 346 (Typh)
 Dreisbach, R. H., (607) (Mal)
 Drysdale A. D., with Pratt & Kirk 1021 (Typh)
 Dubin, I. N., 429, 526 (Mal)
 Dublin W. B., Culbertson, C. G. & Friedman H. P., 396 (Der)
 Dubois, A., 276 (Hel) 836 (R F)
 — & Van den Bergh, L. 298 1196 (B.R.)
 Dubrûle, M., with Browning, Fraser, Shapiro & Gluckman, (410) (Ent)
 —, with — & Shapiro, (410) (Ent)
 Duffy, J. P. & Davidson, L. E., (340) (Leish)
 Dugger, S., with Zimmerman 664 (Haem)
 de Dulanto F., 47 (Lep)
 Dumitresco N. with Combiesco 627, (930) (Typh)
 —, with —, Botez, Sturdza & Zarnea, 931 (Typh)
 —, with —, Combiesco, Popesco & Zarnea, 627, (931) (Typh)
 —, with — & Côtăresco-Manciulesco, 928 (Typh)
 —, with —, Combiesco, Sturdza, Botez, Ciurea & Zarnea, 931 (Typh)
 — N., with —, Popesco, Panaitesco & Zilisteano, 929 (Typh)
 —, with — & Vasiliu, (930) (Typh)
 Duncan, J. T., 395 (Der)
 Duport, M., with Ciuca, Alexa & Athanasu, 1115 (Mal)
 Duque, M., with Ejercito, 611 (Mal)
 Durand-Delaere, R. (499) (Ent)
 —, with Parrot, (499) (Ent)
 Durieux, C., 416, 1095 (Reports, etc)
 Dutt, A. K., with Bhattacharyya, Bhowmik & Ray, (1089) (Ent)
 Duvalon, S., with Stefanopoulo, 629 (Y F)
 Duvalon-Rafin, S., with Rousselot, 262 (R F)
 Dwinelle, J. H., with Rein, Sternberg & Sheldon, 551 (Ys)
 Dwork, K. G., with Shookhoff, 1165 (Hel)
 Dy, F. J. & Del Rosario, F. 517 (Mal)
 — & Gapuz, R. B., 518 (Mal)
 —, with Smith & Cabrera, 612 (Mal)
 Dyer, R. E., 726 (Typh)

E

- Eads R. B., with Randolph & Ogden, 818 (Typh)
 Eareckson, W. M., with Svrbely, Matsuda, Pickard, Solet & Tuemmler, (676) (Ent)
 Early, E. P. M. N., 768 (Def Dis)
 East African Med J., 99 (Reports etc), 151 (Hel)
 Ebert, C., 857 (Hel)
 Ecker, E. E., with Kirk, 1028 (Rab)
 Eckstein, A., 881 (B R)
 Eddey, L. G., 589 (Reports, etc)
 Edelman, M. H., with Spingarn 465 (Am)
 Edelstein, A., with Krakowski, 835 (R F)
 Edeson, J. F. B., with Field, 808 (Mal)
 Edmonds, A. R., (875) (Prot.)
 Edwards, J. T., 235 (Tryp)
 Efrati, P., 867 (Vms)
 Egeli, E. S. & Ergun, S., (78) (Haem)
 Ehrich, W. E. Seifter J., Alburn, H. E. & Begany, A. J., 487 (Hel)
 Eichbaum F. W., 54 (Hel) 82 bis (Vms)
 —, with Leão, 54 (Hel)
 Eichelberger, L. with Atchley, Young, Husted Pullman & Alving, 214 (Mal)
 Eichenwald, H., 875 (Prot)
 Eisentraut, M., with Klose, 426 (Mal)
 Ejercito, A. & Duque M., 611 (Mal)
 Ekblom, T., 205 (Mal)
 El Ghaffar, Y. A., 742 (Am)
 Eliot T. S., with Knisely, Bloch & Warner, 12 (Mal)
 El Kordy, M. I., (363) (Am), 1090 (Lab)
 —, with Halawani 942 (Am)
 Elliott, D. C., 669 (Oph)
 Elliott, D. E., with Hingson, Johansen, Erickson, Meyer, Fite, Wolcott & Prejean, 51 (Lep)
 Elsdon-Dew, R., with Armstrong & Marot, 831 (Am)
 —, with — & Pooler, 259 (Am)
 —, with — & Wilmot, 831 (Am)
 Emmons, C. W., 1080 (Der)
 — & Ashburn, L. L., 495 (Der)
 Epstein, E., (65) (Hel)
 Ercole, Q. N. with Mackerras, 429, 430, 431, 700 bis (Mal)
 Erdei A., 363 (Am)
 Erfan, H., with Erfan, Mousa & Deeb, 643 (Hel)
 Erfan, M., 57 (Hel)
 —, Erfan H., Mousa A. M. & Deeb, A. A., 643 (Hel)
 Ergun, S. with Egeli (78) (Haem)
 Erhardt A. 766 (Hel)

Fitzpatrick, F K, 453 (Typh)
 Fleming, E M, with Shen & Castle, 1074 (Haem)
 Fletcher, O K. Jr, 116 (Mal)
 Floch H, 371 (Lep)
 — & Abonnenc, E (94) *bis* (582) (Ent), (924) (Tryp), (1008) (Mal)
 — & Camain R (66), 853 (Hel) (148), 477, 479 746, 748 *bis* (Lep)
 — & Chassignet R, (94) (Ent)
 — & de Lajudie, P, (1068) (Hel) 1087 (Misc. Dis)
 Florenzano, R with Pizzi & Valle, 340 (Tryp)
 Floris, M, 117 (Mal)
 —, with Spanedda, 797 (Mal)
 Flusser J & Vizala K., 18 (Bl)
 da Fonseca, F & de Azevedo, J F, 62 (Hel)
 Fonseca, F & Wohlwill, F with Pinto M R 1195 (B R)
 Fonseca, L C 863 (Haem)
 Forattini P P (70) (Hel)
 Forbes, J & Horsfall W R 1187 (Ent)
 Forbes M A Jr 1020 (Leish)
 Ford, J & Hall R de Z 504 (Reports, etc.)
 —, Whiteside, E F & Culwick A T 122 (Tryp)
 Forshaw H W, with de Burca 11 (Mal)
 Fort, M, with Schweiz & Baumann 897 (Mal)
 Fourman, L P R 284 (Heat Str)
 Fournier, J, 787 (Reports etc)
 Fournier, A with Thiodet 215 (Mal)
 Fox, H, 777 (Der)
 Fox H J 965 1073 (Sp)
 Fox, I with Maldonado Hernández Morales & Thillet 762 (Hel)
 Fox, J P 817, 819 (Typh)
 —, with Gallardo 451 (Typh)
 —, with Perez Gallardo 24 (Typh)
 —, Rickard, E R Van der Scheer J & Cox, H R 819 (Typh)
 — with Ris 928 (Typh)
 Foy H Kondi A Damkas C Depanian M Lefcopoulou T Bach L G Dax R Pitchford J Shiele P & Langton, M, 316 (Mal)
 Fradkin R with Schmidt Genter & Squires 709 (Mal)
 Francis E 630 (Pl)
 Franco L B with Micks & de Caires 335 (Mal)
 Franco S, with Sagher 51 (Lep)
 Frank H R, 1023 (Typh)
 Fraser F C, with Browning Shapiro Glickman & Dubrúle (410) (Ent)
 Fraser L E Rosenblum H & Danciger, J A 350 (Typh)
 Freedman M with Sadusk & Hjerpe 246 (Typh)
 Freeman G Castillo Sologuren F & Espinosa H 537 (Typh)
 — Varela G Plotz, H & Ortiz Mariotte, C 536 (Typh)
 Freire E P S, with Deane Tabosa & Ledo 331 (Mal)
 Freire F, Jr, with de Oliveira, 896 (Mal)
 Freire de Guzman, A R with Asenjo Mayorel de Asenjo & de Lopez Candal 447 (Mal)

de Freitas, J L P & de Almeida J O 1129 (Tryp)
 Frenkel J K 402, 1184 (Prot)
 Freund J Lipton M M & Pisani, T M 140 (Rab)
 Friedheim E A H 711 *ter* (Tryp), 839 (Ys)
 — Vogel H J & Berman, R L 918 (Tryp)
 Friedlander, J & Moss, G 1176 (Der)
 Friedman, H P with Dublin & Culbertson, 396 (Der)
 Friedman M with Rinehart & Greenberg, 1167 (Def Dis)
 Fritz, R F with Wiley 247 (Typh)
 Frohne, W C & Hart J W, 1002 (Mal)
 Frumusan P with Cattrin & Cousin, 486 (Hel)
 Frye, W W, with Shaffer & Ryden 634 (Am)
 Fuentes Delgado, M, (850) (Hel)
 Fukumi S, with Kawamura Itoh, Itoh, Takagi & Obata 458 (Den)
 Fuller, H S, (499) (Ent)
 Fulton, J D, with Ada 925 (Leish)
 — & Goodwin, T W 916 (Tryp)
 Furcolow M L & Ruhe, J S 1171 (Der)
 Furrado, T A with Aleixo, 283 (Der)

G

Gabaldon A with de Perez, G G, 6 (Mal)
 Gaehlinger H, 937 (Am)
 de Gaefani G F (605) (Mal)
 Gage, J C, (522), (611), (907) (Mal)
 — Rose F L & Scott, M, 338 (Tryp)
 Gahan J B Downs W G & Celis H 1119 (Mal)
 — with — & Colorado Iris 614 (Mal)
 — Gilbert I H Pelly R L & Wilson H G 500 (Ent)
 —, with Pelly 878 (Ent)
 Gaines, T B, with Nicholson McWilliams & Vetter, 26 (Typh)
 Gallardo F P & Fox J P, 451 (Typh)
 Gallard 987 (Reports etc)
 Galliard, H 64 153 560 (Hel) 286 (Misc Dis)
 — & Mille R 1064 (Hel)
 — & Ngu, D V 67 (Hel)
 Galik, L, with Wolfe & Kornfeld, 456 (Typh)
 Gallut J 631 (Chl)
 — & Brounst G 935 (Chl)
 Galvão A L A & Damasceno, R G, 442 (Mal)
 Galvão, P E. (497) *bis* (Heat Str)
 Galvez Fermin N, (380) (Hel)
 Gambles, R M & Coghill, N F 470 (R F)
 Gan, K H., 941 (Am)
 Ganapati, P N, 339 (Tryp)
 Gapuz, R B, with Dy 518 (Mal)
 Garcia Caburro R with Arana Iñiguez & Caubarrere (382) (Hel)
 Garcia Carrillo, E (784) (Misc Dis)
 Garcia, E Y, 1112 (Mal)
 Garcia L S with Morales & Ortiz, 1108 (Mal)
 Garcia Lopez, G Milanes F, Lopez Toca, R, Aramburu, T & Spies, T D, 279 (Sp)
 —, with Spies, Milanes, Lopez Toca & Aramburu 864 (Haem)

- Hinman, E. H., 787 (Reports, etc.)
Hinterman, J., with Blanc, (875) (Prot)
Jinton, M. A. C., 1194 (B.R.)
Hitchcock, D. J., 765, 949 (Hel)
Hitchens, A. P., with Breed & Murray, 188 (B.R.)
Hutchings, G. H., with Falco, Russell & VanderWerff, 1125 (Mal)
Hjerpe, C., with Sadusk & Freedman, 246 (Typh)
Ho E. A., with Hsu, 129 (Leish)
— & Li, Y., 342 (Leish)
— Soong, T. & Li, Y., 815 (Leish)
Hoe S. H., with Singer & Wei, 37, 360 (Chi)
Hoare, C. A., 235 (Tryp)
Hoat, O. D., 67 (Hel)
Hochberg, S., with La Mer 877 (Ent)
Hocking, B., with Twinn, McDuffie & Cross, 580 (Ent)
Hocking, K. S. & MacInnes, D. G., 209 (Mal)
Hoecker, S. G. with Neghme & Felner, 859 (Hel)
Hochne, K., (323) (Mal)
Hoeppli, R. & Feng, L. C., (1021) (Leish)
Hoffman, J. & van Riel, J., 908 (Mal)
Hoffmann, A., 499 (Ent)
Hoffmann, R., 426 (Mal)
Hoffmann, W. H. & Guerra, A., (560) (Hel)
Hofman, M., with Marill & Bertozzi, 1153 (Hel)
Hogben, L., 885 (B.R.)
Hoge, A., (81) (Vms)
Hoge, A. H., with Prado, (81) (Vms)
Hoggarth, E., with Ourd, Landquist & Rose, (329) (Mal)
Holdenried, R., with Meyer, 630 (Pl)
Holder, T. M., with Brooks & Ward, 488 (Hel)
Holstein, M., 410 1186 (Ent)
Holz, S. & Granier, M., (215) (Mal)
Hoodless, D. W., 178 (Reports etc)
van Hoof, L., Henard C. & Peel, E., (338) (Tryp)
— with Peel, 7 699 (Mal)
Hoogstraal, H., with King, (974) (Ent)
Hopkins J. G. Hillegas, A. B. Ledin, R. B., Rebell, G. C., & Camp, E., 282 (Der)
Hormann H., 696 (Mal)
Hornby, H. E., 811 (Tryp)
Horrenberger, R., with Sergeant, Béguet & Parrot 718 (Typh)
—, with — & Parrot, 539 (Typh)
Horsfall, W. R., with Forbes, 1187 (Ent)
— & Porter, D. A., 1105 (Mal)
Horton, S. H., Jr., 1087 (Misc Dis)
Hortopan, with Zalman & David, 538 (Typh)
Horwitz, B., with Lewin & Becker, 255 (Pl)
Hottle, G. A., with Salvin, 166 494 (Der)
Hough J., with Dickinson & Merritt, 291 (Ent)
Hovanitz, W., (933) (Y.F)
Howell, E. V., Jr., with Hunter, Shillam & Trott, 1061 (Hel)
Hsu, K. C., 376 (Hel), 428 (Mal)
Hsu, T. & Ho, E. A., 129 (Leish)
— with — & Li 342 (Leish)
- Huebner, R. J., with Beck, Bell & Shaw, 454 (Typh)
—, Jellison, W. L. & Beck, M. D., (626) (Typh)
—, —, — & Wilcox, F. P., 823 (Typh)
—, with —, —, Parker & Bell, 455 (Typh)
—, with —, Bell, Parker & Walsh, 252 (Typh)
—, with —, Ormsbee, Beck, Parker & Bell, 353 (Typh)
—, with Spicknell & Terry, (457) (Typh)
Huff, C. G., 103, 317 (Mal)
— & Coulston, F., 104 (Mal)
—, with —, 106 (Mal)
Hughes, H. B., with Schmidt & Smith, 327 (Mal)
Hughes, L. E., with Philip, 248 (Typh)
Hughes, M., 873 (Misc Dis)
Hughes, T. P., with Perlowagora, 137 (Y.F)
Humphlett, W. J., Weiss, M. J. & Hauser, C. R., (437) (Mal)
Hung, S. L. & Li, F. P., 273 (Hel)
Hunter, G. W., with Ingalls, McMullen & Bauman, 950 (Hel)
—, Shillam, D. S. Trott, O. T. & Howell, E. V., Jr., 1061 (Hel)
Husted, J. R., with Atchley, Yount, Pullman, Alving & Eichelberger, 214 (Mal)
Hutchinson, M. with Sacktor & Granett, 175 (Ent)
- I
- Ibarra Perez, R., with Oteiza & Gonzalez Prendes, 842 (Lep)
Ibars, A., with Guillen, (48) (Lep)
Ignacio Chala, H. J., 552 (Lep)
d'Ignazio C. & Codeleonecini, E., 25 450 (Typh)
— & Musi, P. S., 452 (Typh)
Iida, T., with Tamiya, Hazato, Yamamoto, Shimojo, Nishioka, Kawamura, Suzuki, Arai, Tsukamoto & Schoble, 927 (Typh)
Imhäuser, K., 29 (Typh)
In der Beeck M., (143) (Chi)
India, 787, 880, 982 (Reports, etc)
Indian Med Gaz., 33 (Pl)
Ingalls J. W., Jr., with Bauman & Bennett, 270 (Hel)
Ingalls, J. W., Jr., Hunter, G. W., McMullen D. B. & Bauman P. M., 950 (Hel)
Innes, J. R., 263, 638 (Lep)
Internat J. Leprosy, 52 (Lep)
Inarte, D. R., 505 (Reports etc)
Irons, J. V., Murphy, J. N. Jr., Rich, A. B. & Hill A. E., 726 (Typh)
Isaac Riaz, R., 255 (Pl)
Ishii, N., 138, 727 (Den) 286 (Prot)
Itano, H. A. & Pauling, L., 865 (Haem)
Itoh, H., with Kawamura, Fukusumi, Itoh, Takagi & Obata, 458 (Den)
Itoh, T., with Kawamura, Fukusumi, Itoh, Takagi & Obata 458 (Den)
Iyengar, M. O. T., with Jafar 109 (Mal)
Iyer B. H., with Bami & Guha, (114) ter (115) (Mal)

- Kasilag, W R, with Cruz & Guytingco, 954 (Hel.)
 Kawamura, A., with Tamiya, Kazato, Yamamoto, Iida, Shimojo, Nishioka, Suzuki, Arai, Tsukamoto & Schoble 927 (Typh)
 Kawamura, R, Fukusumi, S, Itoh, T, Itoh, H, Takagi, S & Obata, Y 458 (Den)
 Ke, F, Chang, H & Liu, W., 26 (Typh)
 Keatinge, A. F H (1089) (Ent)
 Keele, K. D., 861 (Sp)
 Kellaway, C H, 178 (Reports, etc)
 Kelley, G W, with Drake, Hayes, Garman, Johnson, Melamed & Peck (611) (Mal)
 Kelley, W H, with McCord, Switzer & Culp, 280 (Haem)
 Kelsey, F E, with Cantrell & Geiling, 911 (Mal)
 —, with Taliaferro 1122 (Mal)
 Kendall, S B., 850 (Hel)
 Kenney, M & Hewitt, R, 654 (Hel)
 Kenny, T S, with Curd, Hendry, Murray & Rose (215) (Mal)
 Kent, D E, with Larsh (657) (Hel)
 Kent, J F, with Rein, Bukantz, Cooper, Ruhe & Coatney, 1107 (Mal)
 Kenyon R L, with Wiesner, J A & Kwartler, C E, 804 (Mal)
 Kermack, W O, with Douglas (806) (Mal)
 Kershaw, W E., 959 (Hel.)
 — & Bertram, D S, 69 (Hel)
 —, with Plackett, R L., 762 (Hel)
 —, Williamson, J & Bertram, D S, 488 (Hel)
 Ketelslegers J, 857 (Hel)
 Keys, A., with Taylor & Mickelsen (605) (Mal)
 Khalil Bey, M & Hulmy I S (380) (Hel)
 Kho Lien Keng, 617 (Bl)
 Kian, L. P., with Viersma, 828 (Am.)
 Kiang, S & Choa, G H, 746 (Lep)
 Kikuth W, with Bock 540 (Typh)
 — & Gönner, R, 481 (Hel)
 — & Mudrow-Reichenow L., 220, 702 (Mal)
 Killough, J H, with Levine Garzoli & Kuntz, 56 (Hel)
 King, E J Gilchrist, M, Wootton, I D P O'Brien, J R P, Jope H M, Quelch P E, Peterson J M Strangeways D H & Ramsay, W N M, 662 (Haem)
 —, with Macfarlane Wootton & Gilchrist, 661 (Haem)
 —, Wootton I D P, Donaldson, R, Sisson R B & Macfarlane, R G, 663 (Haem)
 King, F E Acheson R M & Spensley, P C. (114) (Mal)
 King H & Wright J (16) (Mal)
 King, J A. with Jones 1024 (Typh)
 King J C, with Singer, Robin & Jefferson, 492 (Haem)
 King, W V & Hoogstraal H (974) (Ent)
 Kini, M G, with Rao & Subrahmanyam, 969 (Ulc)
 Kirby, K. S (706) (Mal)
 Kirk, J B 1102 (BR)
 Kirk, R, 621, 815 (Leish)
 — & Lewis, D J (582) (Ent)
 —, with —, 1088 (Ent)
 —, with Pratt & Drysdale, 1021 (Typh)
 Kirk, R. C & Ecker, E. E., 1028 (Rab)
 Kirkaldy-Wills, W H., 266 (Hel)
 Kirsch, E (1079) (Der)
 Kirwan, E W, 1190 (Reports, etc.)
 Kissin, M & Adleman, R J, 519 (Mal)
 Kitchen S F, with Haddow, Smithburn, Dick & Lumsden, 457 (YF)
 Kleine, F K 1101 (BR)
 Klopfer, S, (907) (Mal)
 —, Slop, D & Opt Land C., 612 (Mal)
 Klopstock, A, Klopstock, E & Rosenkranz, G, 1026 (Typh)
 Klopstock E., with Klopstock & Rosenkranz 1026 (Typh)
 Klose, F & Eisentraut, M, 426 (Mal)
 Knaudt, J A., with Payne & Sharp, 131 (Typh)
 Knibb, S A, with Campbell & Saslaw 396 (Der)
 Knight, A M & Miller J, 940 (Am)
 Knight L A, with Brown & Jellison 352 (Typh)
 Knippling, E F, with Lindquist, Jones & Laake, (583) (Ent)
 Knisely, M H, Bloch E H, Eliot T S & Warner, L 12 (Mal)
 Knoll, H, (970) (Ulc.)
 Knoppers A T 910 (Mal)
 Koeh, Z S with Chung Lim, Chang & Wang, 434 (Mal)
 Koenigsfeld, E G H & Desai, V G 389 (Def Dis)
 Koenigstein R P, 648 (Hel)
 Kohler, C E, 1066 (Hel)
 Kordsumi, K & Lien, J C 219 (Mal)
 Kolta, Z, with Kamal & Messih, (1029) (Chl)
 Komárek, J, with Breindl, 800 (Mal)
 Komarov A & Goldsmid, L 1138 (Typh)
 Komp W H W 1139 (YF)
 Kondi, A, with Foy Damkas Depanian Lefcopolou Bach Dax Pitchford Shiele & Langton 316 (Mal)
 Konitz, L 1045 (RF)
 Konitzam, G L S with Rawkins 1035 (Am)
 Konstam, P G, (65) (Hel)
 Koppisch E, with Pomales Lebron Arbona & Morales Ottero, 132 (Typh)
 Koprowski, H 735 (Rab)
 — & Cox, H R 253 1140 (Rab)
 —, with Jervis 933 (Rab)
 —, with — & Burkhart 1142 (Rab)
 Kornfeld L, with Wolfe 931 (Typh)
 — with — & Gallik 456 (Typh)
 Koszalka M F 569 (Vms)
 Kotcher E with Good 625 (Typh)
 Kotter G F with Bras Rijkbüsch & Ham (869) (Der)
 Kouri P 271, (649) (Hel)
 — with Baer & Sotolongo 952 (Hel)
 — with Gradwohl, 296 (BR)
 Kouwenaar, W & Esseveld H 723 (Typh)
 Kovacs J Jr, with Hill & Rubenstein, 282 (Der)
 Kozar, Z (1064) (Hel)
 Kraan H with Builmer 317 (Mal)
 Krakowski, I & Edelstein A 835 (RF)

- Leffler, M T & Hathaway, R J, (115) (Mal)
 —, with Zaugg & Rapala, (115) (Mal)
 Lefrou, G, 816 (Leish.)
 Le Gac, P, 348 (Typh)
 Legwen, W A, with Lenert, 441 (Mal)
 Lehmann, H, 664, 966 (Haem)
 Lehoult, Y, with Boquet, 393 (Vms)
 Leibovitz, A, 413 (Lab)
 Leiper, J W G, 950 (Hel)
 Leite, A. S., da Luz, J V B & de Meira, M T V, 1078 (Der)
 Lemerle, T H, with Mackerras, 1001 (Mal)
 Lemerle, L. G & Legwen, W A, 441 (Mal)
 Lenert, L. G & Legwen, W A, 441 (Mal)
 Lennette, E H, Clark, W H & Dean, B H, 1138 (Typh)
 Leon L. A., 166 (Der), 177 (Lab) 272 (Hel), 572 (Misc. Dis) 1017 (Tryp)
 Leon Blanco, F & Fite, G L, 478 (Lep)
 Leonardi, G & Pinna, R, 1019 (Leish.)
 Leonardon, with Benhamou & Albou 903 (Mal)
 Leonards, J R., with Skeggs (18) (Bl)
 Leprosy in India, 943 (Lep)
 Leprosy Review, 52 (Lep)
 le Roux, P L, 235 (Tryp)
 Le Rouzic, 922 (Tryp)
 Le Rouzic, J 1015 (Tryp)
 — & Lapeyssonnie L, 919 (Tryp)
 Levavasseur G with Sautet Ardoin & Vuillet, 976 (Ent.)
 —, with — & Vuillet 976 (Ent.)
 Levi Castillo, R, 1193 (B R)
 Levi Della Vida, B., with Rita, 942 (Am)
 Levine, M D Garzoli R F, Kuntz R E & Killough, J H 56 (Hel)
 Lewert, R M, 334 (Mal)
 Lewin W, Becker B J P & Horwitz, B 255 (Pl)
 Lewis, D J 404 (1088) (Ent) 523 (Mal) 532 (Tryp)
 — & Kirk, R., 1088 (Ent)
 —, with — (582) (Ent)
 Lewis H B, Fajans, R S Esterer M B Shen C & Oliphant M 399 (Misc Dis)
 Lewis S R, with Kaplan 1076 (Haem)
 Lewthwaite, R, with Smadek, Jackson & Ley, 626 (Typh)
 — with — Traub Ley, Philip & Woodward 1136 (Typh)
 — with — Woodward Ley, Philip Traub & Savor 27 (Typh)
 Ley, H L, Jr with Smadel Jackson & Lewthwaite 626 (Typh)
 — with —, Traub Philip Woodward & Lewthwaite 1136 (Typh)
 — with — Woodward, Philip, Traub, Lewthwaite & Savor, 27 (Typh)
 Li C H with Chang, Tong & Chun (466) (Am)
 Li F C. 60 (Hel)
 Li F P with Hung 273 (Hel)
 Li L. with Mao 270 559 (Hel)
 Li Y with Ho & Hsu, 342 (Leish)
 — with — & Soong 815 (Leish)
 Liang S C., 671 (Oph)
 Lie Kian Joe, 955 (Hel)
 —, with Bonne & Bras 63 (Hel)
 Liegeois, P, Rousseau, E & Courtois, C., 136 (Y.F)
 Lien, J-C., with Kordsumi, 219 (Mal)
 Lieou, Y C., 729 (Rab)
 Liljestrand, A., (448) (Tryp)
 Lillgren, B L, with Thompson, 1036 (Am)
 —, with —, Bayles & Bush, 446 (Mal)
 Lim, K. T., with Chung, Chang, Wang & Koeh, 434 (Mal)
 Lima Torres, A, 868 (Der)
 Limbos, P, 14 (Mal)
 Lindberg, K, 157 (Hel), (1118) (Mal)
 Lindquist, A W, Knippling, E F, Jones, H A. & Laake, E W, (583) (Ent)
 Linduska, J P & Morton, F A, 522 (Mal)
 Link, V B, 1144 (Pl)
 Lints, H A, with Culwell, Cooper, White & Coatney, 905 (Mal)
 —, with White, Cooper, Coatney, Culwell & Young, 906 (Mal)
 Lippelt, H & Caseltz, F H, 1026 (Typh)
 Lippi M, 321 (Mal)
 Lipschitz, R, with Griffiths, 1169 (Haem)
 Lipton, M M, with Freund & Pisani, 140 (Rab)
 Lister L M, with Pincoffs, Guy, Woodward & Smadel, 250 (Typh)
 Little P, with Sampath 714 (Tryp)
 — & Subbarow, Y, 143 (Chl)
 Liu, W, Chang, H & Wang, P, 24, (452) (Typh)
 —, with Ke & Chang 26 (Typh)
 Liu, W-T 245 (Typh)
 Liu Y, with Yi, Chao & Chow, 489 (Def Dis)
 Lloyd O C & Sommerville, T, 1122 (Mal)
 Locke R F & Helvig, R J, (134) (Typh)
 Lodenkämper, H, 129 (Typh)
 Löffler, W Essler, A F & Macedo, M M, 871 (Misc Dis)
 Loh, W P, with Tao & Woo, 359 (Chl)
 London, I M, Shemin, D, West, R & Rittenberg, D, (773) (Haem)
 Lopes, E M R, with Ferreira 1068 (Hel)
 Lopez, J A with Anzola Falcon & Gomez Marciano, 12 (Mal)
 Lopez Bustos, C 169 (Misc Dis)
 de Lopez Candal, J G, with Asenjo, Freire de Guzman & Mayoral de Asenjo, 447 (Mal)
 Lopez-Monis, C 880 (Reports, etc)
 Lopez Toca, R, with Garcia Lopez Milanes, Aramburu & Spies, 279 (Sp)
 —, with Spies, Garcia Lopez, Milanes & Aramburu, 864 (Haem)
 —, with —, —, —, Stone, Aramburu & Kartus, 1073 (Haem)
 — with — Stone, Garcia Lopez, Milanes & Aramburu 80, 1167 (Haem)
 —, with —, Suarez, Garcia Lopez Milanes, Stone, Aramburu & Kartus, 566 (Haem)
 Lord K A, 291 (Ent)
 Loughlin, E H & Spitz S H 1152 (Hel)
 Louis Sidney with Caubet Abonnenc & René-Boisneuf 318 (Mal)
 Lourenco Marques, Mocambique 984 (Reports etc)

Index of Authors

- Murray, E G D, with Breed & Hitchens, 188 (B.R.)
 Murray, E. S., with Snyder, Yeomans, Zarafonitis & Wheeler, 817 (Typh)
 Murray, J F, with Altmann, 159 (Def Dis)
 Auzi, P S, with d Ignazio, 452 (Typh)
 Muspratt, J (675) (Ent.)
 Müting, L, with Gärtner, 1054 (Hel)
 Myburgh, C A L, with Shaul (418) (Reports, etc.)
- N
- Nadel, E M, with Josephson, Taylor & Greenberg, 1011 (Mal)
 —, Taylor, D, Greenberg, J & Josephson, E S, 809 (Mal)
 Nagaty, H F (946) (Hel)
 — & Zanaty, A F, 664 (Haem)
 Nagi, M, with Hammouda, 389 (Def Dis)
 Nahas, S, with de Arruda, da Costa & Rosenfeld, 816 (Leish)
 Nair, C P, 709, 1118 (Mal)
 Najib Khan (144) (Am)
 Nakamura, K., 1050 (Lep)
 Nalin, P, with Roman, 410 (Ent)
 Napier, L E, 650 (Hel), 768 (Def Dis), 1190 (Reports, etc)
 Nardone, P M, 152 (Hel)
 Nardy, R V, with Collins & Glasgow, 821 bis (Typh)
 Nargund, K S, with Kshatriya (435) (Mal)
 —, with Patel (435) (Mal)
 Nash, T A M, 224, 229 (Tryp)
 Natelson, S, with Zuckerman & Zymaris, 660 (Sp)
 Nature, 338 (Tryp)
 Natvig, L R, 287 (Ent.)
 Nauck E G & Weyer F 541, 626 (Typh)
 Neal, R. A., 470 (Am)
 Neale, J V (1074) (Haem)
 Neel, J A 859 (Hel)
 Neghme, A 859 (Hel)
 — with Noé Bertin & Gutiérrez, 1008 (Mal)
 — Román, J & Sotomayor, R, 1128 (Tryp)
 — & Román J 449 (Tryp)
 Neghme R A, Faiguenbaum A J, Pilotti A M & Silva Campos, R 852, 951 (Hel)
 — Hoecker S, G & Felner P E 859 (Hel)
 de Negri U 908 (Mal)
 — with Giovanardi & Sepulcri 906 (Mal)
 Negroni P, 1173 bis 1174 (Der)
 — & Briz de Negroni, C 1175 (Der)
 — with Carlos Radice 571 (Der)
 — with Cordero & Quiroga 168 (Der)
 — Daglio C A N & Briz de Negroni, C, 167, 1175 (Der)
 — & Vivoli D 1174 (Der)
 Neill, G A W, 927 (Typh)
 Nelson A A & Fitzhugh O G, (214) (Mal)
 Neogoy K N with Krishnan Smith, Bose, Roy & Ghosh 719 721 ter (Typh)
 Neto J C, de M F, Torres, A L & Pinto G F, 513 (Mal)
 Nettel F R 564 (Hel)
 — de O, 643 (Hel)
- New York Acad Sci, 1161 (Hel)
 New York State Dept. of Health, 192 (B R)
 Newbery, G, with Berg, (706) (Mal)
 —, with Mathieson, (907) (Mal)
 Newsome, J, with Halawani, Hafez & Cowper, 753 (Hel)
 Newton, W L, Bennett, H J & Figgat, W B, 851 (Hel)
 Ngu, D V, with Galliard, 67 (Hel)
 Nicholls, L, 277 (Def Dis)
 Nicholson, H P, Gaines, T B, McWilliams J G & Vetter, M H, 26 (Typh)
 Nickel, J F, with Callender, Moore & Powell 773 (Haem)
 Nicol, W D, with Covell, Shute & Maryo 325, 437, 703 (Mal)
 Nieto, C, V X., with Beltrán, 806 (Mal)
 Niño, F L, (42) (Am), (284) (Der)
 —, with di Pietro & Costa, 968 (Der)
 Nishioka, K., with Tamiya, Hazato Yamamoto, Iida, Shimojo, Kawamura, Suzuki, Arai Tsukamoto & Schoble, 927 (Typh)
 Nitzulescu, J, 162 bis (Def Dis)
 Niyamasena, S G, (1058) (Hel)
 Noda, H, with Miyao, Takei & Hatori (429) (Mal)
 Nodenot, L, 238, 917 (Tryp)
 Noé, J, Bertin, V, Gutiérrez, J & Neghme, A, 1008 (Mal)
 — & Mann, F G, 112 (Mal)
 Noel, R & Soeur Marie-Suzanne, (945) (Lep)
 Nogueira J F P, with de Meira & Simões, 208 (Mal)
 Norcross, G & Openshaw, H T, (940) (Am)
 Nor-el-Din, G, with Halawani & Shaker, (383) (Hel)
 Norden, A., 779 (Der)
 Northern Rhodesia 531 ter (Tryp)
 Novicky, R., 824 (Rab)
 Nozawa, T, with Matsubayashi 261 (Am)
 Nufer, K., with Gutscher, 134 (Typh)
 Nuñez, V, (47) (Lep)
 Nunez Andrade, R 394 (Der)
 Nyden S J, 241 (Tryp)
- O
- Obata, Y with Kawamura, Fukusumi, Itoh Itoh & Takagi, 458 (Den)
 Obrador, S, 381 (Hel)
 O'Brien, J P, 780 (Heat Str)
 O'Brien, J R P, with King Gilchrist Wootton, Joje, Quelch, Peterson, Strangeways & Ramsay 662 (Haem)
 Ochsner, A., DeBakey, E G & Dixon, J L, 955 (Hel)
 Oelrichs, L., with Bieling, 1022 (Typh)
 Oesterlin, M (616) (Mal), 1016 (Tryp)
 Ogden, L J, with Randolph & Eads 818 (Typh)
 Ogilvie, A C F with Broughton & Wylie 939 (Am)
 Okabayashi, A., 698 (Mal)
 Olarte, J, with Varela, Pérez-Rebello & Roch, 719 (Typh)
 Olaru, C. with Jonnesco, 731 (Rab)
 Olifan V I, 8 (Mal)

- ellegriño, J, 124, 813, 1129 (Tryp)
 — & Borrotchin, M., 620 (Tryp)
 —, with Dias, 21 (Tryp)
 —, with — & Laranja, 620 (Tryp)
 elliciotta, R., 84 (Heat Str)
 ellissier, A., with Ceccaldi, Trinquer & Amoult, 967 (Vms)
 elloux, A. & Decourt, P., 814, 1131 (Tryp), 1188 (Ent)
 eña Chavarria, A., Ovaes Arias, J. C., Romero López, A., Fallas Diaz, M. & Castro Jenkins, A., 342 (Leish)
 —, with Anderson, Johnstone, Bostick & Packer, 1146 (Am)
 eña Garcia, B., 988 (Reports, etc)
 emido H. M., de Sousa, E. F. & Bezerra, F. P. G., Jr., 610 (Mal)
 —, —, Pinto, D. B. & Bezerra, F., Jr., 332 (Mal)
 enn, G. H. (900) (Mal)
 eralta, B., with Moe & Seevers, 607 (Mal)
 Peralta, R., with Reyes, Barrientos, Rodriguez & Carranza Amaya, 639 (Lep)
 Pereira, H. G. Travassos, J. & Vasconceles, J. V., 1023 (Typh)
 Pereira, O., 485 (Hel)
 Perera, C. A., 1179 (Oph)
 Perez Fontana, V., 650 (Hel)
 Perez Gallardo, F. & Fox, J. P., 24 (Typh)
 Perez, G. G., with Gabaldon, 6 (Mal)
 de Pérez J., with Ayub, (256) (Pl)
 Pérez Rebelo, R., with Akle Delgadillo, 625 (Typh)
 —, with Varela, Roch & Olarte, 719 (Typh)
 Perez Santiago, E., with Suarez, Hernandez-Morales, Marchand & Torregrosa, 661 (Sp)
 Perez Santiago, E., with —, Rodriguez-Molina, Torregrosa & Benitez-Gautier, 391 (Sp)
 Perlowagora, A. & Hughes, T. P., 137 (YF)
 Perrin, A., with Sédallian & Maral, 1159 (Hel)
 Perrin, T. L., 822 (Typh)
 Perry, W. L. M., 277 (Hel)
 — with Hawking, 219, 334 (Mal)
 Pesigan, T. P., 152 (Hel)
 Pessoa S. B., 595, 1191 (BR)
 — with Coutinho, 1058 (Hel)
 — & Villela, F. F., 343 (Leish)
 Peta, T., 903 (Mal)
 Peters, L. Bueding, E., Valk, A. D. Jr., Higashi, A. & Welch, A. D., 763 (Hel)
 Peters, R. F., with Gray, 290 (Ent)
 Peterson, J. M., with King Gilchrist, Wootton, O'Brien, Jope Quich, Strangeways & Ramsay, 662 (Haem)
 Petrie, P. W. R., 1135 (Typh)
 Petrishcheva, P. A., 535 (Leish)
 Pettman, W. E. C., 217 (Mal)
 Peuziat, Y., with Beaudiment & Brochen, 918 (Tryp)
 Peuziat, Y., with Beaudiment & Brochen, 918 (Tryp)
 Pfeffer, K. H., (625) (Typh)
 Philup, C. B., 455 (Typh)
 — & Hughes, L. E., 248 (Typh)
 —, with Smadel, Traub, Ley, Woodward & Lewthwaite, 1136 (Typh)
 —, with —, Woodward, Ley, Traub, Lewthwaite & Savoor, 27 (Typh)
 —, Traub, R. & Smadel, J. E., 1135 (Typh)
 Phillips, H. S., with Tillman, 649 (Hel)
 Philpot, V. B., Jr., 1076 (Vms)
 Piccioli, A., 70 (Hel)
 Pick, F., 977 (Lab)
 —, with Deschiens, 482 (Hel), 672 (Ent)
 Pickar, D. N. & Kramer, H. M., 543 (Rab)
 Pickard, H. B., with Svrbely, Eareckson, Matsuda, Solet & Tuemmler, (676) (Ent)
 Piedrola Gil, G., (877) (Ent)
 Pieraerts, G., 1166 (Def Dis)
 Piers, F., 569 (Der)
 di Pietro, A., Niño, F. L. & Costa, L. P., 968 (Der)
 Piette, M., with Siguer & Crosnier, 1037 (Am)
 Pifano, C. F., 268 (Hel)
 —, with Jaffé & Mayer, 756 (Hel)
 —, with Mayer, 757, 758 (Hel)
 —, with — & Luttermoser, 757 (Hel)
 Pifano, F., 923 (Tryp)
 Pilin, E., with Mauzé, (148) (Lep), (249) (Typh)
 —, with — & Ruggiero, 249 (Typh)
 Pilott, M., with Neghme, Faiguenbaum & Silva Campos, 852, 951 (Hel)
 Pincoffs, M. C., Guy, E. G., Lister, L. M., Woodward, T. E. & Smadel, J. E., 250 (Typh)
 Piñeyro, R., with Pardo Castello, 147 (Lep)
 Piñeyrua, J., with Vigil & Diez, (65) (Hel)
 Pinkerton, H., with Greiff, 246 (Typh)
 Pinna, R., with Leonardi, 1019 (Leish)
 Pinto, A. R., with Ferreira & de Almeida, 1105 (Mal), 1127 (Tryp)
 Pinto, C., 1017 (Tryp)
 Pinto, D. B., with Pezido, de Sousa & Bezerra, 332 (Mal)
 Pinto, G. F., with Neto & Torres, 513 (Mal)
 Pinto M. R., with Fonseca & Wohlwill, 1195 (B.R.)
 Pinto O. da S., with de Mello, 1120 (Mal)
 de Pinzon, T., with de Rodaniche, 875 (Prot.)
 Pipkin, A. C., 937 (Am)
 — & Rizk, E., 845 (Hel)
 Pirazzi, R., with Biaggi, 647 (Hel)
 Piringer, W., 139 (Rab)
 Pirou, L., with Brun-Buisson, Diallo & Caille, 123 (Tryp)
 Pisani, T. M., with Freund & Lipton, 140 (Rab)
 Pitchford, J., with Foy Kondi, Damkas, Depanian, Lefcopoulou, Bach, Dax, Shuele & Langton, 316 (Mal)
 Pitner, G., McNamara, W. L. & Gogolak, F. M., 60 (Hel)
 Pittendrigh, C. S., 320 (Mal)
 Pizzi, T., Valls, J. & Florenzano, R., 340 (Tryp)
 Plackett, R. L. & Hewlett, P. S., (293) (Ent)
 —, with Kershaw, 762 (Hel)
 Pletziy, D. F., 248 (Typh)

- Raoult, A, 336 (Bl)
 —, Auffret, C, Tanguy, F & Martin, M, 913 (Bl)
 —, with Jonchere & Auffret, 528 (Bl)
 Rapala, R T, with Zaugg & Leffler, (115) (Mal)
 Raper, A B, 169 (Misc Dis), 665 (Haem)
 Ravelli, A, 1055 (Hel)
 Raventos, J, with Madinaveitia, 522 (Mal)
 Rawkins, M D & Konstam, G L S, 1035 (Am)
 Ray, A P, 612 (Mal)
 Ray, S N, with Bhattacharyya, Dutt & Bhowmik, (1089) (Ent)
 Raynaud, R, Miniconi, P & Chevrot, L 902 bis (Mal)
 Reardon, L V & Bartgis, I L, 828 (Am)
 Rebell, G C, with Hopkins, Hillegas, Ledin & Camp, 282 (Der)
 Rebello, J L, with Patel, 35 (Pl)
 Rector, E J with Rector 496 (Der)
 Rector, L E & Rector, E J, 496 (Der)
 Redaelli, P & Ciferri, R 281 (Der)
 Reddy, D G & Thangavelu M, 741 (Am)
 Reed, J G, 987 (Reports, etc)
 Reeves W C, Brookman, B & Hammon, W McD, 173 (Ent)
 Reichenow, E, 194 (B.R)
 —, with Carini 833 (Am)
 —, with Mudrow-Reichenow, 1126 (Mal)
 Reid, J A, (524) 1002 (Mal)
 Reid, J A G, with Crawford 71 (Def Dis)
 Reidel, L M, with Harris, 527 (Mal)
 Rein, C R, Bukantz, S C, Kent J F, Cooper, W C Ruhe, D S & Coatney, G R, 1107 (Mal)
 —, Sternberg T H, Dwinelle J H & Sheldon, A J, 551 (Ys)
 Lemlinger & Bailly J, 356 (Rab)
 Rempel J G with Riddell & McNelly, 93 (Ent)
 René-Boisneuf, P, with Caubet, Abonnenc & Louis Sidney, 318 (Mal)
 Rendtorff, R C with Maier & Suárez, 584 (Ent)
 Rés J F with de Azevedo, Roque, Colaco, Cristino & Coelho, 1062 (Hel)
 Rev Sanidad e Hig Publica, 427 (Mal)
 Reye, E J & Mahony F, 841 (Lep)
 Reyes, E., Barrientos, E Rodriguez J J, Carranza Amaya A & Peralta, R, 639 (Lep)
 Reyes R V, (92) (Ent)
 Reynes V, with Alain & Saint Etienne 971 (Misc Dis)
 Riblet L with Weinbaum & Benedict, (872) (Misc Dis)
 Rice, E C, with Ross, Schienbach, Burke, Bryer & Washington, 350 (Typh)
 Rice F A, with Coggeshall, 706 (Mal)
 Rich A B, with Irons, Murphy & Hill, 726 (Typh)
 Richardson, A P, with Fieser, (115) (Mal)
 Richardson, D N, with Ashworth, Crowther, Curd, Hendry & Rose, (611) (Mal)
 —, with Crowther, Curd & Rose, (216) (Mal)
 Rickard, E R, 347 (Typh)
 —, with Fox, van der Scheer & Cox, 819 (Typh)
 Rickards, A G, 361, 468 (Am)
 Ricketts, W E, 135 (Bart)
 Riddell, W A, Rempel, J G & McNelly, E, 93 (Ent)
 Riedel, B B, 657 (Hel)
 — & Lunde, M N, 962 (Hel)
 van Riel, with Hoffman, 908 (Mal)
 Riessenman, F R, with Chang & Alston, 378 (Hel)
 Rigby, E. P, 873 (Misc Dis)
 Rigdon, R H, 333 (Mal), 810 (Bl)
 —, with Rusk, 1121 (Mal)
 Rijkbuisch, L, with Bras, Kotter & Ham, (869) (Der)
 Riley, A & Robins, G M, 802 (Mal)
 Rinehart, J F, Friedman, M & Greenberg, L D, 1167 (Def Dis)
 — & Greenberg L D, 1167 (Def Dis)
 Ris, H & Fox, J P, 928 (Typh)
 Risquez-Iribarren, R, Cordero Moreno, R & Anduze P J, 1082 (Oph)
 — & Ortiz, C, I, 273 (Hel)
 Rita, G & Levi Della Vida, B, 942 (Am)
 Ritchie, L S & Davis, C., 547 (Am)
 —, with Davis, 548 (Am)
 Rittenberg, D, with London, Shemin & West, (773) (Haem)
 Ritter, F H, 1081 (Der)
 Ritterson, A L & Stauber, L A, 450 (Leish)
 Rivoalen A, 23 (Typh)
 Rizk E, with Pipkin 845 (Hel)
 Ro, M, with Yokogawa, (950) (Hel)
 Roantree, W B 732 (Rab)
 Roberts, J I, 432 bis 606, 1104 (Mal), 491 (Haem), 641 (Hel)
 Robin, S with Singer, 1168 (Haem)
 —, with —, King & Jefferson, 492 (Haem)
 Robins, G M, with Riley, 802 (Mal)
 Roch E, with Varela, Pérez Rebelo & Olarte, 719 (Typh)
 Rocha, A, with de Magalhães, 349, 725 (Typh)
 Rocha e Silva M, Beraldo, W T & Rosenfeld, G, 866 (Vms)
 Rockefeller Foundation 299 (B R)
 Rockenmacher, M, 825 (Pl)
 Rodaniche, A, with de Rodaniche, 455 (Typh)
 de Rodaniche, E & de Pinzon T, 875 (Prot.)
 de Rodaniche, E C, 252 (Typh)
 — & Rodaniche, A, 455 (Typh)
 Rodhain, J, 443 (Mal)
 Rodrigues, B A, with Guimarães, 777 (Der)
 Rodrigues, P M & Travassos, J, 349 (Typh)
 Rodriguez, J J, with Reyes, Barrientos Carranza Amaya & Peralta, 639 (Lep)
 Rodriguez, M, J D, (376) (Hel)
 Rodriguez López-Neyra, C, (382) (Hel)
 Rodriguez-Molina R, Lang, A A, Acevedo, C E, Jimenez-Torres C. F, with Diaz, R, 558 (Hel)
 —, with Suarez, Perez-Santiago, Torregrosa & Benítez Gautier, 391 (Sp)
 Rodriguez Perez, A. P, with Alvarez Lowell & Puchol 1051 (Lep)
 — Alvarez Lowell & Puchol 46 (Lep)
 Rogers, E. W with Marshall, 324 (Mal)

- Smart, J, 245 (Typh), 300 (B R)
 Smit, A. M., with Gispén & Westermann, 1024 (Typh)
 Smith, C. C., with Schmidt & Hughes, 327 (Mal)
 Smith, C. E., Beard, R. R. & Saito, M. T., 495 (Der)
 — Saito, M. T., Beard R. R., Rosenberger, H. G. & Whiting, E. G., 1172 (Der)
 Smith, C. H., 772 (Haem)
 Smith, C. N. & Burnett, D., Jr., (95), 1187 (Ent.)
 —, Cole, M. M. & Gouck, H. K., (930) (Typh)
 Smith, D., 768 (Def Dis)
 Smith, D. A., with Barakat, 962 (Def Dis)
 Smith, E. A., 174 (Ent)
 Smith, G. B. L., with Schneller, (411) (Ent.)
 Smith, G. W., with Chang Riesenman & Alston, 378 (Hel)
 Smith, H. F., Dy, F. J. & Cabrera, D. J., 612 (Mal)
 Smith, L. W., with Johnstone & Winsche, 877 (Ent)
 Smith, M., with Davey, F. 706 (Mal)
 Smith, N., with Travis, Gjullin, Blanton & Wilson, (1088) (Ent)
 Smith, P. K., with Gimble & Davison, 467 (Am)
 Smith, R. O. A., with Krishnan Bose, Neogy, Roy & Ghosh, 719 721 *rer* (Typh)
 Smithburn, K. C., with Dick, 542 (YF)
 — with Haddow, Dick, Kitchen & Lumsden 457 (YF)
 — & Lumsden W. H. R., 823 (YF)
 Smitskamp, H. 963 (Def Dis)
 Smyly, H. J. 366 (Am)
 Snyder, F. M. & Cross, H. F., 540 (Typh)
 —, with —, 820 (Typh)
 — with —, 540 (Typh)
 Snyder, J. C., with Bovarnick, 927 (Typh)
 —, Murray, E. S., Yeomans, A. Zarafonetis, C. J. D. & Wheeler, C. M., 817 (Typh)
 — with Strode, Whayne, Williams & Sapero, 100 (Reports, etc)
 Soares J. A., 53 (Lep)
 Soares J. C. M. Jr with Meira, 949 (Hel)
 Sofole, A., with Ciuca Constantinesco & Teriteanu 324 (Mal)
 Sohler, R. Gregoire J. & Ranc A., 521 (Mal)
 So, K., with Magara, Go & Akima, 782 (Ulc)
 Sohler, R. Gregoire, J. & Ranc A., 521 (Mal)
 Solet I. S., with Svrbely, Eareckson, Matsuda, Peikard & Tuemmler (676) (Ent)
 Sommerville, T. with Lloyd, 1122 (Mal)
 Soong, T., with Ho & Li, 815 (Leish)
 Soper, F. L. 183
 Sotolongo F. with Baer & Kourí 952 (Hel)
 Sotomayor, R., with Neghme & Román, 1128 (Tryp)
 Soulage, J., 1037 (Am)
 Soule, M. H. 590 (B R)
 de Sousa E. F., with Penido & Bezerra, 610 (Mal)
 — with —, Pinto & Bezerra 332 (Mal)
 de Sousa, M. T. & de Almeida, L., 1020 (Leish)
 South Pacific Board of Health 886 (B R)
 de Souza-Araujo, H. C. (480), 750 *bis* 1150 (Lep)
 de Souza Campos, N. & Bechelli, L. M., 681, 682 (B R)
 —, — & Rotberg, A., 678 (B R)
 —, with de Souza Lima, 678 (B R)
 de Souza Lima & others, 49 (Lep)
 Souza Lima, L. & Castro Cerqueira G. de, 372 (Lep)
 de Souza Lima, L. & de Souza Campos, N., 678 (B R)
 Soysa, E., 577 (Misc Dis)
 Spain, D. M., Molomut, N. & Warshaw, L. J. (242) (Tryp)
 Spanedda, A. & Floris, M., 797 (Mal)
 Sparks, P., with Schweigert & Panzer (165) (Haem)
 Sparling, H. J., Jr., with Kyle & McKay, 383 (Hel)
 Spensley, P. C., with King & Acheson, (114) (Mal)
 Spicknall, C. G., Terry, L. L. & Huebner R. J. 457 (Typh)
 Spies, T. D., Garcia Lopez, G., Milanes, F. Lopez Toca R. & Aramburu, T. 864 (Haem)
 —, with —, —, — & —, 279 (Sp)
 —, Stone R. E., Garcia Lopez, G., Milanes, F., Lopez Toca, R. & Aramburu, T., 80 1167 (Haem)
 —, Garcia Lopez, G., Milanes, F., Stone R. E., Lopez Toca, R., Aramburu, T. & Kartus S., 1073 (Haem)
 — & Suarez, R. M., 391 (Sp)
 —, with Suarez, 391 (Sp)
 —, —, Garcia Lopez, G., Milanes, F., Stone, R. E., Lopez Toca, R., Aramburu, T. & Kartus, S., 566 (Haem)
 Spingarn C. L. & Edelman, M. H. 465 (Am)
 Spinks, A., 118 (Mal), (813) (Tryp)
 Spitz, S. H., with Loughlin, 1152 (Hel)
 Spitzer, H., 970 (Misc Dis)
 Sprent, J. F. A. & Chen, H. H., (854) (Hel)
 Sprunt, D. H., with McVay & Laird, 1044 (Am)
 Squires, W., with Schmidt, Genter & Fradkin, 709 (Mal)
 Stacey G. J., with Crowther, Curd & Davey, (907) (Mal)
 —, with Curd & Davey, (907) (Mal)
 Stagg, H. E., (806) (Mal)
 Stahler N., with Terzian & Weathersby, 909 (Mal)
 Stahlmann, W., with Thonnard-Neumann, 899 (Mal)
 Stancioli, J. & Diniz, O., 944 (Lep)
 Standen, O. D., 946 (Hel)
 Stanic M. (1076) (Vms)
 Stauber, L. A., with Ritterson, 450 (Leish)
 van Steenis, P. B., 547 (742) (Am.), 606 (Mal)
 Stefanini, M., 658, 770 (Sp)
 Stefanopoulo, G. J. & Dovolon S., 629 (YF)
 — & Schneider, J. 275 (Hel)
 Stein, K. F., (962) (Hel)
 Stenborg R. L., with Suerli, 708 (Mal)
 Sternberg T. H. with Rein, Dwinelle & Sheldon, 551 (Ys)

- Terzian, L. A., Stahler, N. & Weathersby, A. B., 909 (Mal)
 — & Weathersby, A. B., 609 (Mal)
 Tetzlaff, F., 1118 (Mal)
 Thangavelu, M., with Reddy, 741 (Am)
 Thatcher, J. S., with Scheff, 619 (Tryp)
 Themme, H., with Dold, 761 (Hel)
 Theodor O., with Leeson, 10 (Mal)
 Théodorides, J., 785 (Misc Dis), 1089 (Ent)
 Thetford, N. D., Otto G. F., Brown, H. W. & Maren, T. H., 68 (Hel)
 van Thiel P. H., with Doeleman, 314 (Mal)
 Thillet, C. J., with Maldonado, Hernández Morales & Fox, 762 (Hel)
 Thodet, J. & Fourrier, A., 215 (Mal)
 Thompson, H. V., 141 (PL)
 Thompson, P. E., with Bayles, A., Bush, D. L. & Lillgren, B. L., 446 (Mal)
 — & Lillgren, B. L., 1036 (Am)
 Thompson, R. K., Wagner, J. A. & MacLeod, C. M., (280) (Haem)
 Thompson, S., 852 (Hel)
 Thomson, F. A., 768 (Def Dis)
 Thomson R. C. M., 439 (Mal)
 Thonnard-Neumann, E. & Stahlmann, W., 899 (Mal)
 Thorborg, N. B., Tulinius, S. & Roth, H., (71) (Hel)
 Thorp, J. M., de Meillon, B. & Hardy, F., 675 (Ent)
 —, with — & —, 292 (Ent)
 Thurman, D. C. Jr., Mulrennan J. A. & Thurman, E. B. (876) (Ent)
 — with Taylor & Mulrennan, 349 (Typh)
 Thurman E. B., with Thurman & Mulrennan, (876) (Ent)
 Thurston, J. P., with Hawking & Sewell, 156 (Hel)
 Tidy, H. 57, 847 (Hel) 497 (Heat Str)
 Tiliakos, M., with Doxiades, 164 (Def Dis)
 Tillman A. J. B. & Phillips, H. S., 649 (Hel)
 Timuşescu, A., with Ciuca Baliff, Chelaresco & Constantinesco 321 (Mal)
 — with —, — Vasilu Munteanu & Trofin 329 (Mal)
 Timpler, H. with Salzer & Andersag (18) (Mal)
 Timsit, R. with Athias & Zermati (622) (Leish)
 Tisseul, J., (147) 149, 745 (Lep)
 Tjong Njan Han 145 (Am)
 Toma A. with Balceanu & Constantinesco, (1140) (Rab)
 Tommasino, P. with Fernandez, Carboni & Guminez, 480 (Lep)
 Tong W. K. with Chang Chin & Li (466) (Am)
 Toranzo L. B. 1000 (Mal)
 Torgersen O. 1045 (Am)
 Tregosa M. V. with Suarez, Hernandez-Morales Marchand & Perez Santiago 661 (Mal)
 — with — Perez-Santiago Rodriguez-za & Benitez Gautier 391 (Sp)
 — A. L., with Neto & Pinto 513 (Mal)
 — Muñoz, A. (1068) (Hel)
 Toulant, M., with Toulant & Larmande, 1177 (Oph)
 Toulant P., Larmande, A. & Toulant, M., 1177 (Oph)
 Toulmanoff, C., with Hérnau, 357 (Pl)
 —, with Jaujou, 315 (Mal)
 Touzin R., with Alain Massal & Porte, 1037 (Am)
 Town, B. W., Wills, E. D. & Wormall, A., 914, 1127 (Tryp)
 Trager, W., (408) (Ent) 446 (Mal)
 Trapido, H., 411 (Ent)
 Trapnell, C. G., Martin J. D., Allan, W. & others, 100 (Reports, etc)
 Traub, R., with Philip & Smadel, 1135 (Typh)
 —, with Smadel, Ley, Philip, Woodward & Lewthwaite, 1136 (Typh)
 —, with —, Woodward, Ley, Philip, Lewthwaite & Savoro, 27 (Typh)
 Travassos, J., with Pereira & Vasconcelos, 1023 (Typh)
 —, with Rodrigues, 349 (Typh)
 Travis, B. V., Gjullin, C. M., Blanton, F. S., Smith, N. & Wilson, C. S., (1088) (Ent)
 Trent, S. C., 275 (Hel)
 Treviño Villaseñor, A., with De la Garza Brito, 1147 (Am)
 Triffler, T., 130 (Typh)
 Trim A. R. (486) (Hel)
 Trincão, C., 127, (924), 1018 *ter*, 1019 *bis* (Leish), 1012 (Bl), 1074 (Haem)
 Trinquier E., with Ceccaldi, Arnoult & Pellissier 967 (Vms)
 Tripodi, M., 466 (Am)
 Trofin M. V., with Ciuca Baliff Chelaresco, Timuşescu & Vasilu-Munteanu, 329 (Mal)
 Troit, O. T., with Hunter, Shillam & Howell, 1061 (Hel)
 Trowell H. C., 158, 389, 768 (Def Dis)
 —, with Parry & Berry, 179 (Reports, etc)
 Tsavaris, B., (340) (Leish)
 Tsui, Y. H., with Wu, 568 (Vms)
 Tsukamoto, R. with Tamiya, Hazato, Yamamoto Iida Shimojo Nishioka Kawamura, Suzuki Arai & Schoble 927 (Typh)
 Tu, S., with Yang 471 (RF)
 Tuemmler, W. B. with Svrbely, Eareckson, Matsuda, Pickard & Solet, (676) (Ent)
 Tulinius, S., with Thorborg & Roth (71) (Hel)
 Tunçman, Z. M. 139 (Rab)
 Tuomela, A., with Hernberg, 205 (Mal)
 Turaf J. Blanchon P. & Cabail, J. L. 1183 (Misc. Dis)
 Turnbull G. C. & Cooley J. C. 1034 (Am)
 Turner C. N., with Wood, Garlick, Motteram, Weiden Moore & Mackay 860 (Def Dis)
 Turner E. A. 635 (Am)
 Turner E. E. with Hall (437) (Mal)
 Turtz, C. A. 1081 (Oph)
 Twinn C. R., (1088) (Ent)
 — Hocking B. McDuffie W. C. & Cross, H. F. 580 (Ent)
 — McDuffie Sharp Cross & Wilson (1088) (Ent)

- Terzian, L A, Stahler, N & Weathersby, A B, 909 (Mal)
 — & Weathersby, A B, 609 (Mal)
 Tetzlaff, F, 1118 (Mal)
 Thangavelu, M, with Reddy, 741 (Am)
 Thatcher, J S, with Scheff, 619 (Tryp)
 Themme, H, with Dold, 761 (Hel)
 Theodor, O, with Leeson, 10 (Mal)
 Théodorides, J, 785 (Misc Dis), 1089 (Ent.)
 Theftord, N D, Otto, G F, Brown, H W & Maren, T H, 68 (Hel)
 van Thiel, P H, with Doeleman, 314 (Mal)
 Thillet, C. J, with Maldonado, Hernández Morales & Fox, 762 (Hel)
 Thuodet, J & Fourrier, A, 215 (Mal)
 Thompson, H V, 141 (Pl.)
 Thompson, P E, with Bayles, A, Bush, D L & Lillgren, B L, 446 (Mal)
 — & Lillgren, B L, 1036 (Am)
 Thompson, R K, Wagner, J A. & MacLeod, C M, (280) (Haem)
 Thompson, S, 852 (Hel)
 Thomson, F A, 768 (Def Dis)
 Thomson, R C M, 439 (Mal)
 Thonnard-Neumann, E & Stahlmann, W, 899 (Mal)
 Thorborg, N B, Tulinus, S & Roth, H, (71) (Hel)
 Thorp, J M, de Meillon, B & Hardy, F, 675 (Ent)
 —, with — & —, 292 (Ent)
 Thurman, D C, Jr Mulrennan, J A & Thurman, E B, (876) (Ent)
 — with Taylor & Mulrennan, 349 (Typh)
 Thurman, E B, with Thurman & Mulrennan, (876) (Ent)
 Thurston, J P, with Hawking & Sewell, 156 (Hel)
 Tidy, H, 57, 847 (Hel), 497 (Heat Str)
 Tiliakos, M, with Doxiades, 164 (Def Dis)
 Tillman, A J B & Phillips, H S, 649 (Hel)
 Timişescu, A., with Ciuca, Ballif, Chelaresco & Constantinesco, 321 (Mal)
 — with —, Vasiliu Munteanu & Trofin, 329 (Mal)
 Timmler, H with Salzer & Andersag, (18) (Mal)
 Timsit, R, with Athias & Zermati, (622) (Leish)
 Tisseuil, J., (147), 149 745 (Lep)
 Tjong Njan Han, 145 (Am)
 Toma, A, with Balteanu & Constantinesco, (1140) (Rab)
 Tommasino, P, with Fernandez Carboni & Gimenez, 480 (Lep)
 Tong, W K., with Chang Chin & Li (466) (Am)
 Toranzos, L B, 1000 (Mal)
 Torgersen, O, 1045 (Am)
 Torregrosa, M V, with Suarez, Hernandez-Morales Marchand & Perez Santiago, 661 (Sp)
 —, with — Perez-Santiago, Rodriguez-Molina & Benitez-Gautier, 391 (Sp)
 Tórras A. L., with Neto & Pinto 513 (Mal)
 Torres Muñoz, A., (1068) (Hel)
 Toulant, M, with Toulant & Larmande, 1177 (Oph)
 Toulant, P, Larmande, A & Toulant, M, 1177 (Oph)
 Toulmanoff, C., with Hérivaux, 357 (Pl)
 —, with Jaujou, 315 (Mal)
 Touzin, R, with Alain, Massal & Porte, 1037 (Am)
 Town, B W, Wills, E D & Wormall, A, 914, 1127 (Tryp)
 Trager, W., (408) (Ent.), 446 (Mal)
 Trapido, H, 411 (Ent.)
 Trappner, C. G, Martin, J D, Allan, W & others, 100 (Reports, etc)
 Traub, R, with Philip & Smadel, 1135 (Typh)
 —, with Smadel, Ley, Philip, Woodward & Lewthwaite, 1136 (Typh)
 —, with —, Woodward, Ley, Philip, Lewthwaite & Savor, 27 (Typh)
 Travassos, J, with Pereira & Vasconcelos, 1023 (Typh)
 —, with Rodrigues, 349 (Typh)
 Travis, B V, Gullin, C M, Blanton F S, Smith, N & Wilson, C S, (1088) (Ent)
 Trent, S C, 275 (Hel)
 Treviño Villaseñor, A, with De la Garza Brito, 1147 (Am)
 Triffiterer, T, 130 (Typh)
 Trim, A R (486) (Hel)
 Trincão, C., 127, (924), 1018 *ter*, 1019 *bis* (Leish.), 1012 (Bl), 1074 (Haem.)
 Trinquier, E, with Ceccaldi, Arnoult & Pellissier, 967 (Vms)
 Tripodi, M, 466 (Am)
 Trofin, M V, with Ciuca, Bahiff Chelaresco, Timişescu & Vasiliu-Munteanu, 329 (Mal)
 Trott, O T, with Hunter, Shillam & Howell, 1061 (Hel)
 Trowell, H C, 158, 389, 768 (Def Dis)
 —, with Parry & Berry, 179 (Reports, etc)
 Tsavaris, B, (340) (Leish)
 Tsui, Y H, with Wu, 568 (Vms)
 Tsukamoto, R, with Tamiya, Hazato, Yamamoto Ida Shimojo Nishioka, Kawamura, Suzuki, Arai & Schoble, 927 (Typh)
 Tu, S, with Yang, 471 (R F)
 Tuemmler, W B, with Svrbely, Eareckson, Matsuda, Pickard & Solet, (676) (Ent)
 Tulinus, S, with Thorborg & Roth, (71) (Hel)
 Tunçman, Z M, 139 (Rab)
 Tuomela, A., with Hernberg 205 (Mal)
 Turiaf, J, Blanchon, P & Cabail, J L., 1183 (Misc Dis)
 Turnbull, G C & Cooley J C, 1034 (Am)
 Turner C. N., with Wood, Garlick Motteram, Weiden, Moore & Mackay, 860 (Def Dis)
 Turner E A, 635 (Am)
 Turner E E, with Hall, (437) (Mal)
 Turtz, C. A 1081 (Oph)
 Twinn, C R, (1088) (Ent)
 —, Hocking, B McDuffie, W C & Cross, H F, 580 (Ent)
 —, McDuffie, Sharp Cross & Wilson (1088) (Ent)
 Tyndel, M, 90 (Misc Dis)

- Warshaw, L J, with Spain & Molomut, (242) (Tryp)
 Washington, 1093 (Reports, etc)
 Washington, J A, with Ross, Schoenbach, Burke, Bryer & Rice, 350 (Typh)
 Watanabe, M, with Hayashi, 1024 (Typh)
 Waterlow, 768 (Def Dis)
 Watson, J M, 554 (Hel)
 —, Abdel Azim, M & Halawani, A, (380) (Hel)
 — & Ali Al Hamami, 846 (Hel)
 — & Azim, M A, 948 (Hel)
 —, with —, 946 (Hel)
 Watts, J C, 497 (Heat Str)
 Weathersby, A B, with Terzian, 609 (Mal)
 —, with — & Stahler, 909 (Mal)
 Wegmann, T, 1026 (Typh)
 Wei, S H, with Singer & Hoa 37, 360 (Chl)
 Weiden, S, with Wood, Garlick, Motteram, Moore, Mackey & Turner, 860 (Def Dis)
 Weinbaum, J G Riblet, L & Benedict, C D, (872) (Misc Dis)
 Weiner, J S, 497 (Heat Str)
 Weiner, M, with Wroblewski & Shapiro, (771) (Haem)
 Weise, W, 616 (Bl)
 Weiss, M J, with Humphlett & Huser, (437) (Mal)
 Weiss, P, 1170 (Der)
 Weiss, R, with Hanel, 961 (Hel)
 Welch A D with Peters Bueding, Valk & Higashi, 763 (Hel)
 Welsh, H H, with Jellison Bell, Huebner & Parker, 252 (Typh)
 Wender, L, 1194 (B.R.)
 Wenyon, C. M., 41 (Am)
 West, J B 587 (Reports etc)
 West, R with London, Shemin & Rittenberg, (773) (Haem)
 Westermaan, C D with Gispén & Smut, 1024 (Typh)
 Western Australia, 346 (Typh)
 Westphal A., 546 (Am)
 — & Marshall, F, 636 (Am)
 Wetzel, F E, with Jones & Black, (280) (Haem)
 Weyer, F, 193 (B.R.) 537 623, 624, 627, 716, 818 (Typh) 603 (Mal)
 —, with Nauck 541, 626 (Typh)
 Whayne, T F, with Strode, Williams, Saperó & Snyder 100 (Reports, etc)
 Wheeler, C. M., with Snyder, Murray, Yeomans & Zafaronets, 817 (Typh)
 Whitaker, H W Jr 1176 (Der)
 White, J C, with Dacie, (489) (Haem)
 White, R S, 605 (Mal)
 White, W C, Cooper, W C, Coatney, G R, Culwell, W B, Lints, H A & Young M D, 906 (Mal)
 —, with Culwell Cooper, Lints & Coatney, 905 (Mal)
 Whiteside E F, 922 (Tryp)
 — with Ford & Culwick 122 (Tryp)
 Whiting E G, with Smith, Saito, Beard & Rosenberger, 1172 (Der)
 Whitney, D M, with Anigstein & Benrison, 725 (Typh)
 —, with — & Hansen, 244 (Typh)
 Whittick, R J 300 (B.R.)
- Wiesner, J A., with Kenyon & Kwartler, 804 (Mal)
 Wigand, R., 1072 (Hel)
 Wigglesworth, A., 879 (Reports, etc)
 Wigglesworth, V B, (403) (Ent)
 Wilcox, A, with Haas & Coleman, 909 (Mal)
 —, with —, Laird, Ewing & Coleman 1108 (Mal)
 Wilcox, F P, with Huebner, Jellison & Beck, 823 (Typh)
 Wilde, J K H, (814) (Tryp)
 Wiley, J S & Fritz, R F, 247 (Typh)
 Willcocks, R G, 914 (Tryp)
 Wilcox, P H A, 133 (Typh)
 Williams, A W & Mackey, J P, 774 (Haem)
 Williams, L L, Jr with Strode, Whayne Saperó & Snyder, 100 (Reports, etc)
 Williams, P L, with Asquith & Hammick, (15) (Mal)
 Williams, R B, 1028 (Rab)
 Williams, R W, with Brown, 1066 (Hel)
 Williams, W J, Schelling, V & Hartman, F W, 762 (Hel)
 Williamson, J, 118 (Mal)
 —, with Kershaw & Bertram, 488 (Hel)
 —, with Rollo & Lourie, 118 (Mal)
 Wills, E D, with Town & Wormall, 914, 1127 (Tryp)
 Wilmot, A J, with Armstrong & Ejsdon-Dew 831 (Am)
 Wilson, C S with Travis, Gjullin, Blanton & Smith, (1088) (Ent)
 Wilson, D A. O., with Hensch, 330 (Mal)
 Wilson, D B, with Garnham & Wilson, 10 (Mal)
 Wilson, H G, with Gahan, Gilbert & Peffly 500 (Ent)
 Wilson M E with Garnham & Wilson, 10 (Mal)
 Wilson S G 292 (Ent), 919 (Tryp)
 Wilson T, 274 (Hel)
 Wilson, T H, with Dickstein, Landmesser Love & Wolman, 773 (Haem)
 Wilson, W M, with McDuffie, Sharp, Cross & Twinn, (1088) (Ent)
 Winckel C. W F, 13 (15), (114), 904 (Mal)
 Wingstrand K. G., 615 *bis* (Mal)
 Winsehe W E with Johnstone & Smith 877 (Ent)
 de Wit, J C. 656 (Hel)
 Wohlwill, F with Fonseca & Pinto, 1195 (B.R.)
 Wojciechowska S with Kryfski 1022 *bis* (Typh)
 Wolcott, B R, with Hingson, Johansen Erickson Elliott Meyer, Fite & Prejean, 51 (Lep)
 Wolfe D M & Kornfeld L, 931 (Typh)
 — & —, with Gallik, L, 456 (Typh)
 Wolff J W, 96 (Lab)
 Wolman I J, with Dickstein, Landmesser, Love & Wilson 773 (Haem)
 Wong W W, 1177 (Oph)
 Wong Y T with Overman & Hill 801 (Mal)
 Woo M O, with Tao & Loh 359 (Chl)
 Wood, E A, (379) (Hel)
 Wood F D, (70) (Hel)

Alouatta palliata in Truck 44 km altitudes

Alouatta palliata sanguineus

natural range of habitat 43

new locality record 103

Alouatta palliata in the 1st of trip 146 87

Amphibian

in Florida 341

in the 1st of trip 175

in the 1st of trip 175 Brazil 930

in the 1st of trip 175 Brazil 930

in the 1st of trip 175 Brazil 930

Amoeba

in the 1st of trip 175

in the 1st of trip 175

Amoeba 476

AMOEBAE AND INTESTINAL PROTOZOAL INFECTIONS

44-45, 144-145, 157-162

361-367, 449-450, 346-349

61-63, 740-745, 828-835

936-941, 1031-1045, 1145-

1148

in Africa 937

Brazil 811

Brazil 4

Canada 615

Chicago 1011

Colombia 573

England 936

India 446, 741, 939

(in the 1st of trip 175)

Mediterranean 1011

Netherlands 828

North Africa 544

South Africa 61

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

Amoeba

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

in the 1st of trip 175

Amoebiasis—cont

treatment—cont

- quinoxyl retention enema, 466
- sulphasuxidine, 831
- thioarsenites as amoebicides, 1146
- vioform, blood iodine level after, 940
- ulceration co-existent with typhoid, 741
- water borne
- epidemiological problems, 1031
- incubation period, 1032
- survival of cysts, 1032

Amoebic

- abscess of brain, 1034
- liver, 938
 - in India, 741
 - treatment by chloroquine, 1036

colitis

diagnosis, radiological, 258

hepatitis, 741

in India, 741

diagnosis

elevation of diaphragm, 1034

treatment

- conessine, 832
- emetine and streptomycin, (744)
- vaginitis, 742

Amoeboma in India, 741

Anacardium occidentale as vermicide, 54 (*see also* Cashew Oil)

ANAEMIA

in Fiji, 392

Punjab, 771

São Paulo Brazil, 863

Addison's in Punjab, 771

Cooley's

in Australia, 966

Cyprus, 567

negroes 966

detection of mild types, 772

dietary deficiency and, 863

dyshaemopoietic, 772

erythroblastic *see* Cooley's anaemia

hookworm, in Philippines, 954

hypochromic, with hookworm in Fiji 392

macrocytic

in Burma sepoys 491

Punjab 771

Uganda, 664

hyperchromic

treatment by vitamin B₁₂, 1168

neurologic sequelae 165

nutritional

effect of injection of animal protein factor concentrate, 1073

treatment

vitamin B₁₂ 1167

parenteral, 864

nutritional macrocytic [SIPPE] (book review) 506

pernicious injection of animal protein factor concentrate 1073

relation to ankylostomiasis, 664

treatment

anahaemin, 864

Examen 864

folic acid 80, 81 966

Reticulogen 864

Anaemia—cont

macrocytic—cont

treatment—cont

thymine, 80

vitamin B₁₂, 80, 566, 1167

tropical, 166

megalocytic

treatment by folic acid, 393

pernicious

in the tropical negro, 664

treatment

folic acid, 165

vitamin B₁₂, 566, 864

pregnancy

treatment

folic acid, 81

pteroylglutamic acid, 80

sickle cell, (78), 1074

in Africa, 665

Brazilian Indians, 666

Curacao, 966

South Carolina, 1075

alopecia and, 865

bone changes in 967

conglutination and, 1075

diagnosis, rapid, 1168

diagnostic test, 865

electrocardiographic abnormalities (280)

experimental production, 1074

fate of transfused corpuscles 492

inheritance of, (1074)

life-span of, 492

ovalocytosis and 1075

pathogenesis, 492

pathological significance, 1075

plasma transfusions in, 1076

rapid determination of sickling by dithionite, 774

rapid method of demonstrating, 492

sickling in new-born negroes 775

sudden death in, 665

survival of red cells, 773

viscosity of erythrocytes, 280

Anaplasma marginale in rodents of Asmara, 1161

Anchau Settlement Scheme 229, 1128

*Ancylostoma**brasiliense*

creeping eruption and, (66)

in French Guiana, 853, 1087

Martinique 577

Szechuan dogs, 376

Alberta dogs, 677

caninum

human infection in China, 486

vermicidal activity of Cashew oil on, 54

duodenale infection

coincident with *Isospora belli*, 1148

as treatment of polycythaemia vera, 664

Animal colony, experimental, in West Africa, 587

Encyclopaedia Mammals [WENDER] (book review), 1194

Anisus convexiusculus intermediate host of echinostome in Java, 63

sarasinorum first intermediate host of echinostome in Java, 64

ANKYLOSTOMIASIS

see also *Ankylostoma*

- in B. J. G. 389
 Dutch 731
 Gabon estuary 844
 Ken 641
 N. J. 43, 43
 O. 154
 P. 954
 P. 106
 Portuguese Gu. 844 1013
 Queensland 852

campaign in Queensland 85
 cause of anemia in Brazil 843
 duodenal ulcer and 361
 epidemic (183)
 from loss of worms by egg-eaters in faeces 933

kwashiorkor syndrome and 663
 lesions due to 64
 in practice 933
 in time

Chenopodium anthelmoides 954
Ptychostomum 483
Isotrachylethylene 483

Anoph.

- of B. J. G. and Moravia 800
 Brazil 319
 China 603
 Danzig coast 1104
 I. 105
 Kenya Highlands 878
 Maricao 318
 North Borneo 100
 S. 105
 Tarsus, N. Ch. 11
 Thailand 11
 V. 100, Mexico 879

bre d. replaces in Southern France 1104
 control

DDT and benzene hexachloride by belt
 control 110

in Italy 437
 mode of 440
 residual 908

distribution

- in Borneo 317
 Cayman 317
 I. 105
 Pakistan 317

eradicated from Cyprus 807
 hibern. 100
 K. 100
 K. 100
 K. 100

collected in Arab. 316
 Copepod 100
 G. 100

M. 100
 M. 100
 M. 100
 M. 100

paper in the field 100
 W. 100

in the field 100
 in the field 100
 in the field 100

Anopheles

in B. J. G. 389
 in B. J. G. 389

in Arab. 317
 in Arab. 317
 in Arab. 317

in Central Am. 441
 in Central Am. 441
 in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

in Central Am. 441
 in Central Am. 441

Anopheles—cont*coustani*

in Morocco, 317

larvae in Arabia, 517

malaria and, in Uganda, 9

crucians

winter survival in S Carolina, 1002

culicifacies

in India 110

infected by *T. kahwanensis*, 126

larvae in Arabia, 517

malaria and,

in Bombay, 17

Fort Sandeman India, 11

Thailand, 11

var *adenensis*

in Socotra, 11

darlingi

in Argentina, 332

Bolivia, 218

Brazil, 319

British Guiana, 589

Dutch Guiana, 698

biology of, 212

control

in Amazonia, 331

periodical use of DDT necessary in

British Guiana, 1120

duration of action of DDT on, 442

natural obcyst infections of, in Venezuela, 12

oviposition sites, 517

rearing of 212

seasonal cycle in Colombia, 698

demeilloni

in Uganda 9

dihahi

larvae in Arabia 517

var *wardi* in Socotra, 11*durem* in Ruanda-Urundi, 876*eiseni* in Veracruz, Mexico, 899*ehutns* see *A. sacharovi**farauti*

biology of, in New Guinea, 1105

filariasis and in New Guinea, 1105

vector of malaria in New Guinea, 1105

filipini in Manila City, 518*flavicosta* in West Africa 697*fluviatilis*

larvae in Arabia, 517

malaria and

in Bombay 17

Thailand 11

winter variations in larvae of, in India, 11

funestus

in East Africa 209

Kenya highlands 898

Uganda, 10

bionomics of, 209

control

pyrethrum 908

gambiae

in Belgian Congo 330

Cape Verde Islands, 208

East Africa 209

Kenya highlands, 898

Portuguese Guinea, 1105

Liberia, 587

Uganda, 10

Anopheles—cont*gambiae*—cont

barrier to invasion of Egypt by, 523

bionomics of, 209

breeding on *Potamogeton* in Egypt 516

control

dispersible powder DDT, 439

Gammexane, 440

pyrethrum, 908

eradication from Egypt, 438, 523

vector in Belgian Congo, 601

Nairobi, 1104

hispantola larvae in Arabia, 517

in Morocco, 317

hyrcanus in Burma 210

in Southern France 1103

breeding places in Central Asia chemical factors of, 10

larvae in Arabia, 517

var *nigerrimus*

in India 110

Manila City 518

Szechuan, 429

var *pseudopictus* in Venice 800*sinensis*

in China, 219

Szechuan 428

malaria and in China, 603

nocturnal activities in Formosa, 900

unini (289)*insulæflorum* malaria and, in Thailand, 11*fejporiensis*

in Burma 210

Indo-China, 206

malaria and, in China, 603

var *candidiensis* nocturnal activities in Formosa, 900*kingi* in Uganda, 10*kochi*

malaria and, in the Philippines, 518

North Borneo, 1002

letifer

residual effect of DDT spray on, 1118

leucosphyrus

in Burma 210

malaria and, in North Borneo, 1002

varieties of, 1002

vector of malaria

in Assam, 1002

Borneo, 1002

Burma 1002

litoralis in Manila City, 518*ludlowi* in North Borneo 1002

nocturnal activities in Formosa, 900

maculatus in Burma 210

insecticides and 613

malaria and,

in China, 603

N Borneo 1002

nocturnal activities in Formosa, 900

residual effects of DDT spray on 1118

maculipennis

in Finland, 205

Morocco, 317 432

Sweden, 205

altitude and seasonal breeding 432

control

dubious effect of DDT, 908

Anopheles—cont*constant*

- in Morocco, 317
- larvae in Arabia, 517
- malaria and, in Uganda 9

crucians

- winter survival in S Carolina, 1002

culicifacies

- in India, 110
- infected by *T. kalwanensis* 126
- larvae in Arabia, 517
- malaria and,
 - in Bombay, 17
 - Fort Sandeman, India, 11
 - Thailand, 11

var adenensis

- in Socotra, 11

darlingi

- in Argentina, 332
- Bolivia, 218
- Brazil, 319
- British Guiana, 589
- Dutch Guiana, 698
- biology of, 212
- control
 - in Amazonia, 331
 - periodical use of DDT necessary in British Guiana, 1120
- duration of action of DDT on, 442
- natural oöcyst infections of, in Venezuela, 12
- oviposition sites, 517
- rearing of 212
- seasonal cycle in Colombia 698

demeilloni

- in Uganda, 9

dthali

- larvae in Arabia, 517
- var wardi* in Socotra, 11

dureni in Ruanda-Urundi, 876*eiseni* in Veracruz, Mexico, 899*elutus* see *A. sacharovi**farauti*

- biology of, in New Guinea 1105
- filariasis and in New Guinea, 1105
- vector of malaria in New Guinea, 1105

filipini in Manila City 518*flavicocta* in West Africa 697*fluvialis*

- larvae in Arabia, 517
- malaria and
 - in Bombay 17
 - Thailand 11
- winter variations in larvae of in India, 11

funestus

- in East Africa 209
- Kenya highlands 898
- Uganda 10
- bionomics of 209
- control
 - pyrethrum 908

gambiae

- in Belgian Congo 330
- Cape Verde Islands, 208
- East Africa 209
- Kenya highlands, 898
- Portuguese Guinea 1105
- Liberia 587
- Uganda 10

Anopheles—cont*gambiae*—cont

- barrier to invasion of Egypt by, 523
 - bionomics of, 209
 - breeding on *Potamogeton* in Egypt, 516
 - control
 - dispersible powder DDT, 439
 - Gammexane, 440
 - pyrethrum, 908
 - eradication from Egypt, 438, 523
 - vector in Belgian Congo, 601
 - Nairobi, 1104
 - hispaniola* larvae in Arabia, 517
 - in Morocco, 317
 - hyrcanius* in Burma, 210
 - in Southern France 1103
 - breeding-places in Central Asia chemical factors of, 10
 - larvae in Arabia, 517
 - var nigerrimus*
 - in India, 110
 - Manila City, 518
 - Szechuan, 429
 - var pseudopictus* in Venice, 800
 - sinensis*
 - in China, 219
 - Szechuan 428
 - malaria and in China, 603
 - nocturnal activities in Formosa, 900
- immi* (289)
- insulaeflorum* malaria and, in Thailand, 11
- jeyporiensis*
 - in Burma 210
 - Indo-China, 206
- malaria and, in China, 603
- var candidiensis* nocturnal activities in Formosa, 900
- kingi* in Uganda, 10
- kochi*
 - malaria and, in the Philippines, 518
 - North Borneo, 1002
- letifer*
 - residual effect of DDT spray on, 1118
- leucosphyrus*
 - in Burma 210
 - malaria and, in North Borneo, 1002
 - varieties of, 1002
 - vector of malaria
 - in Assam, 1002
 - Borneo 1002
 - Burma, 1002
- litoralis* in Manila City, 518
- ludlowi* in North Borneo, 1002
- nocturnal activities in Formosa, 900
- maculatus* in Burma 210
- insecticides and 613
- malaria and,
 - in China, 603
 - N Borneo 1002
- nocturnal activities in Formosa 900
- residual effects of DDT spray on 1118
- maculipennis*
 - in Finland, 205
 - Morocco, 317 432
 - Sweden 205
- altitude and seasonal breeding 432
- control
 - dubious effect of DDT, 908

Anopheles—cont.*maculipennis*—cont.

hibernates in Venice and protozoan
cycle 516

percentage of late development, 8
rates of development in Germany 603
in Southern France 1103

atroparvus

on Danish coast, 1105

in Hungary 894

Netherlands 115

Salerno 8

Southern France 1103

Sweden 205

on sea and, in China 603

refractory to certain strains of *P.*
falsiparvus 437

test tube for breed. g. 8

vector in Russia an epidemic 1115

cantharoid 1103

freeborni

experimental hybridization with

A. quadrimaculatus 318

sexuality in foregut 318

latransilius

in Corsica 315

Isle d'Elbe 315

Salerno 8

maculipennis

shown from Isle d'Elbe 1105

on Danish coast, 1104

melanura, 1103

in Salerno 8

melanura

in B. hem. ad Mors la, 800

D. m. h. key 1115

D. m. g. coast, 1105

Germany) potential vector 476

Hungary 894

P. land, chief vector 1000

Salerno malaria ad. 8

Southern France 1103

S. Sea 205

Upper Silesia 476

tickborne (relax) see *A. cantharoid*

typ

in B. hem. ad Mors la, 800

Hungary 894

Salerno 8

Southern France 1103

S. Sea 205

Upper Silesia 476

maculipennis

Manila C. 7 518

maculipennis

maculipennis vector in the Philippines 518

maculipennis

maculipennis malaria and, in Uganda,

maculipennis

in Arona, Italy 11

maculipennis

maculipennis malaria and, in Uganda,

maculipennis malaria and, in Uganda,

maculipennis malaria and, in Uganda,

Anopheles—cont.*maculipennis*

in Arona 217

Arona 10

India-Ch. 2, 206

Salerno 429

maculipennis ad, in China 603

in China 11

maculipennis ad, in China 900

in China 517

maculipennis vector in the Philippines 518

in China 61

maculipennis in Belg. Congo 330

in Belg. Congo 330

in Morocco 317

Larvae in Arab. 517

vector of malaria in Egypt 51

maculipennis in Venezuela, M. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

maculipennis in Dutch G. 894

Anopheles—cont*quadrimaculatus*

in Florida, 111

North-east Mexico, 429

Veracruz, Mexico, 899

action of antimalarial drugs on infected, 909

experimental hybridization with *A. maculipennis freeborni* 318

hibernation of, 1002

permeability of fabrics to, 522

rearing on large scale, 111

susceptibility to foreign *P. vivax* 323

testing insecticides, 524

ramsayi, in India 110*rangeli*, seasonal cycle of, in Colombia, 698*rufipes* var *ingrami* in West Africa, 697*sacharovi*

in Corsica 315

eradication from Cyprus, 807

malaria and in China, 603

in Salerno, 8

malaria, chief vector of in Saideh, 707

vector in Rumanian epidemic, 1115

sergenti

in Morocco 317

larvae in Arabia, 517

vector of malaria in Morocco, 317

splendidus nocturnal activities in Formosa, 900*stephensi*infectibility with Lagos strains of *P. falciparum* 437

larva in Arabia 516

malaria and, in Fort Sandeman India, 11

strodrei

in Veracruz, Mexico, 899

seasonal cycle in Colombia 698

subpictus

in India 110

filariasis and, in Ceylon, 487

var *indefinitus* in Manila City, 518*sundaicus*control of breeding by *Eichhornia speciosa* 17

in Malaya, by DDT, 709

residual effect of DDT spray on 1118

varying infectivity, 605

superpictus

in Azouniyeh 707

Cyprus eradication 807

larvae in Arabia 517

malaria and in Salerno 8

tarsimaculatus

chief vector of malaria in Rio de Janeiro, 514

tescellatus

in Manila City, 518

North Borneo 1002

nocturnal activities in Formosa 900

trannulatus

seasonal cycle in Colombia, 698

var *davisi* in Dutch Guiana 698*turkluudi*

in Morocco 317

larvae in Arabia 517

10859

Anopheles—cont*vagus*

in Burma 210

India 110

development of larvae in sea water, 432

varuna in India 110*vestitipennis* in Veracruz, Mexico, 899

Anophelines, South American, Atlas of, [LEVI CASTILLO] (book review), 1193

Anthelmintics, observations on, 480

Antimalarial(s) (907)

aliphatic ketones, (114)

aryl-cyanoguanidines, (115)

inhibition by pteroylglutamic acid, 1125

purines, 1125

naphthoquinone, (115)

substituted arylbiguanides, (115)

sulphabiguanide derivatives, (114)

synthetic (215-16)

paludrine homologues 118

tolerability of, 904

Antimalarial premunition, 206, 207, 513

Antimonial

effects on heart in schistosomiasis, 61

Antivenenes

Ipsen's method of testing potency of, 394

potency, testing of, 394

preparation of, 393

scorpion

Prionurus australis 280, 868

snake

Bitis spp., 967

cobra

standardization of, 493

titration of, 568

Daboia

standardization of, 493

titration of, 568

Naja flava

standardization, (775)

Aoki method of staining *M. leprae*, 843

Aphthosis of Touraine see Behcet's syndrome

Appendicitis

Entamoeba histolytica and 938

enterobiasis and, 857

parasites and, 578, 956

Aralen see Chloroquine

Argas persicus

SNP as insecticide, 1131

toxicity of SNP for, 1188

Armigeres obturbans filariasis and, in Ceylon, 487

Aromatic diamidines pharmacology of, 916

Arthropods

of interest in Colombia, (92)

medical and veterinary, (92) 981

Arthus reaction produced by protozoon, 450

Artibeus planirostris trinitatis and paralytic rabies in Trinidad, 254

Arylbiguanides substitutes in malaria, (115)

Arylcyanoguanidines in malaria, (115)

- BARTONELLOSIS**, 135-136, 354-355, 628, 1027
 in Ecuador, 573
Bartonella bacilliformis anaemia, clinical features of, 135
 Carrion's disease
 nervous symptoms in, 628
 treatment
 intradermal autohaemotherapy, 354
 penicillin, 628
 Bathing drawers" dermatitis, 652
 Bechuanaland Protectorate, report on water resources 676
 Beetles, human infestation by, 785
 Behcet's syndrome
 in Chinese woman, 498
 Cuba, 91
 differential diagnosis 498
 Belgian Congo Annual Report of Medical Directorate-General for 1948 1189
 Belivron in the treatment of leprosy, 50
 Benzil for impregnating clothes against typhus mites, 540
 Benzoic acid for impregnating clothes against typhus mites, 540
 Berek effect in staining blood-parasites 502
 Beriberi
 in Philippines 390
 thiamin excretion in, 391
Biomphalaria see *Planorbis*
pfeifferi molluscan host of *Sch. mansoni* in Kenya 641
 Bisulphate-binding substances (BBS) in malnutrition 278
Bitis
arietans antivenene, 967
gabonica antivenene 967
nasicornis antivenene 967
Bixa orellana see also Urucu
 preparations as protectives against sunburn, 671
 Bixine protective against sunburn 671
 Black fungus see *Tinea nigra* *Cladosporium* "erneckii
 Black snake" see *Pseudohoa cloelia*
BLACKWATER FEVER, 18, 120-122 336 448 528-530 616 617 810 811 913 1012
 in China 603
 French Equatorial Africa 120
 mechanism of 120
 pathology of, 448
 prolonged in 528
 treatment by decapsulation of kidneys 528
 kidney (18)
 n 617
 Blackwater Fever—cont
 low ascorbic acid in, 913
 methaemalbumin in, 616
P. vivax and, 18
 Rh factor in, 121
 Schumm's reaction in, 616
 treatment
 ascorbic acid, 913
 complete substitution of blood by donor, 1012
 neo antergan, 336
 penicillin, 18
 surgical, 336
Blaps mortisaga in man, 1089
Blastocystis
 in animals at Rome Zoological Gardens, 179
 infection in Kenya 70
Blastocystis hominis detection by duodenal intubation, (380)
Blastomyces dermatitidis
 cross reactions with *Histoplasma capsulatum* 869
 yeast form cultures for complement fixation, 83
 Blastomycin and histoplasmin compared, 779
 Blastomycosis see also *Paracoccidioides brasiliensis*
 in South America, 84 168, 397
 ano rectal, 84
 buccal, (167)
 Hodgkin's disease and, 397
 treatment
 failure of promin, 1176
 streptomycin, 1176
 sulphadiazine 84
 vaccine 84
 and sulphonamide 168
 Blood blister disease in Singapore, 73
 cell counts, simplified method, (771)
 erythrocytes
 osmotic resistance in congenital haemolytic icterus 773
 Cooley's anaemia 773
 sickle cell anaemia 773
 varying with race 773
 films staining of, by alizarin red S and phosphomolybdic acid, 95
 cyanol 95
 fuchsin and methyl green 95
 panchromatic, rapid, 96
 haemoglobin estimation, 661 (771)
 by grey-wedge photometer 663
 iron content of blood 662
 oxygen capacity, 662
 values of Finland population, 1074
 polycythaemia vera treatment by *Ancylostoma* infection, 664
 pressure
 in American negro 89
 Australian aborigines 89
 Bantus 89
 Bengalis 88
 Cantonese 88
 East Africans 89
 Egyptians, 88
 Filipinos, 88
 non-Europeans 88

Culex—cont

bahamensis in Netherlands Windward Islands, 408

cinereus in Ruanda Urundi, 876

fatigans

in Caribbean Islands, 675

Liberia, 587

Netherlands Windward Islands, 408

Socotra, 11

United States of America, 673

effective flight range", 173

filariasis and, in Ceylon, 487

vector of filaria in Porto Rico, 762

habilitator

in Netherlands Windward Islands, 408

mauritanicus

validity of species, (876)

musarum breeding in plant axils, 172

pipiens

in United States of America, 673

var *pallens*

reaction to aircraft environment, 171

quinquefasciatus see *C. fatigans*

sitlens

in Socotra, 11

filariasis and, in Ceylon, 487

stigmatosonia

flight range of 173

tarsalis

flight range of, 173

precipitin test for feeding habits, 93

tritaeniorhynchus

filariasis and, in Ceylon, 487

Culicines

acid-fast bacilli in, 368

tree-hole breeding parasites of larvae, (675)

Culicoides

suspected transmitter of *Dipetalonema streptocerca* in the Congo, 276

grahami

vector of *Acanthocheiloneuma perstans* in Anglo-Egyptian Sudan 957

Caliseta

alaskaensis in Manitoba, 580

incidens flight range of 174

Cynomyia gunnisoni

plague of in fleas 1144

Cysticercosis (484)

in Chile, 381

Mexico 381

cerebral 381 484 (850)

intraocular (65)

of lungs X-ray appearances 1055

ocular 1179

diagnosis

complement fixation, 382

resembling myopathy (154)

Cysticercus

cellulosae in rodents of Asmara 1161

fasciolaris in rodents of Asmara 1161

Damodar Hooghly Flood Flush Scheme, 110

Davey chick test, standard inocula for, 118

DDT duration of effect of sprays on building materials in Venezuela, 584

Death, causes of, classification 1092

DEFICIENCY DISEASES, 71-77, 158-165, 277-279, 388-391, 489, 565 566, 657-658, 766-770, 860-861, 962-964, 1072-1073, 1166-1167

in Anglo Egyptian Sudan, 74

East African railway workers, 158

Gold Coast, 278

Malaya, 277

P O W in Far East, 71

Singapore, 73

affections of mucous membranes, 73

"black tongue" and, 164

cutaneous affections, 73

low ascorbic acid as cause of onychia, 860

low blood vitamin C levels in W African soldiers 964

millet beer as protective food, 74, 75

ocular symptoms, 278

peanuts as protective food, 74, 75

phrynoderma in Fiji children, 768

serum protein in adult Chinese, 489

symptoms in P O W, 72

thiamin deficiency,

cardiac lesions in, 963

experimental, effect on heart of monkey, 1167

nervous system of monkey, 1167

vitamin C content of organs of West Africans, 964

xerophthalmia in Fiji children 768

Deinocerites cancer

in Caribbean Islands, 675

Netherlands Windward Islands, 408

DENGUE AND ALLIED FEVERS, 30, 137-139 458-459 629 630, 727-728

in Madagascar 30

control, 30

diagnosis, complement fixation, 629

similarity to Red fever of the Congo, 459

virus

antigenic relationship with that of yellow fever, 630

cultivation, 137

in embryo chicks 458

immune serum 138

immunity studies 727

mouse-brain 138

rabbit-eye 138

virus fixe, 137

Dermacentor

marginatus in U.S.S.R. 249

nuttalli in U.S.S.R., 248

pictus in U.S.S.R., 249

silvarum in U.S.S.R., 248

vector of spotted fever in U.S.S.R., 249

variabilis in Florida, 349

Dermanyssus gallinae on rats in Mexico, 819

Dermatitis

allergic, in Calcutta 570

caused by contact with *Hylestia* 282

mepacrine (905)

Neoschoengastia nuñeri larvae 394

quinacrine 607

seborrhoeic in Calcutta 570

verrucous in Cochin China 968

Dermatobia cyaniventris causing myiasis in French Guiana (582)

Elephantiasis—cont

- bacillary
 in Ecuador, 573
 South Persia, 632
 with amoebiasis, 467
 carriers in S Persia, 633
 balantidial
 in Egypt, 942
 Norway, 1045
 South Persia 632
 Zoological Gardens, London, 261
 giardial
 in France 941
 India, 942
 avitaminosis A in, 1148
 epilepsy in, (1147)
 treatment
 atebrin 834
 mepacrine, 942
 new carboxylic acid derivative, 1045
 sniphaguanidine, 633
 East African High Commission Report for 1948, 1188
Echinodnophaga gallinacea
 on rats in Mexico, 819
 City, 499
 reduction by dusting with DDT, 247
 Echinococcosis of lungs X ray appearances, 1055
 Echinococcus see Hydatid disease
Echinococcus alveolaris of lung X-ray appearances 1055
Echinolaelaps echidninus
 on rats in Mexico 819
 City 499
 reduction by dusting with DDT 247
Echinoparyphium recurvatum
 in man in Java 63
 Malayan Archipelago 63
Echinostoma indoensis
 in Celebes 64
 Malayan Archipelago 64
 man in Java 64
 revolutum
 in Java 64
 Malayan Archipelago, 64
 Ectoparasites, apparatus for chemotherapeutic control 292
 Egyptian splenomegaly, with hepato-lienal fibrosis 1058
Eichornia crassipes
 larvae of *Coquillettidia* and, 67
 Mansonia and 67
Eimeria falciformis
 in rodents of Asmara 1161
 nieschulzi
 in rodents of Asmara, 1161
 "Electric feet" in deficiency disease, 72
 Elephantiasis
 filariasis and, 401
 nostras in France 401
 pathology of, 68
 of scrotum
 heparin and absence of thrombosis, 487
 serum calcium and 68
 streptococcal
 treatment by rubiazol, 854
 Emetine
 distribution studies, 467
 excretion studies, 467
 structure of, (940)
 toxic action on heart, 636
 toxicity studies, 467
 Encephalitis
 control in California, 500
Encephalitozoon see Toxoplasma
 Endocarditis
 gonococcal in Africans, 575
 septicaemic in Africans 575
 Endochin in malaria, 219
Endolimax nana
 in epidemic dysentery, 547
 effect of diodoquin on 469
 in returning forces, 362
Entamoeba
 caudata
 new species from the dog in Brazil, 833
 coli
 in Esquimos, 376
 Portuguese Guinea, 845
 returning forces, 362
 Scioa, 1033
 cysts detected by duodenal intubation (380)
 in dysentery epidemic, 547
 effect of diodoquin on 469
Entamoeba histolytica
 action of carobinase on, 833
 emetine on, 831
 amoebostatic action of emetine, 831
 appendicitis caused by, 938
 cultivation, 40, 260, 828
 advantage of streptomycin, 466
 in hydatid fluid, (363)
 culture methods, 634
 cultures
 effect of hyaluronic acid and
 hyaluronidase on, 549
 synergistic activity of penicillin and
 streptomycin, 549
 cysts
 lethal effect of acetic acid on, 830
 method of obtaining free from bacteria, 635
 viability in soil, 829
 effect of diodoquin on, 469
 growth requirements of, 634
 pathogenicity enhanced by bacteria 937
 phagocytosis of starches by, 637
 strains of, varying resistance to drugs 1043

- E. amurensis* Akaiwa, new sub-species
in Alberta 677
1st sub-species, 347
Arona, 641
Nairobi children, 437
Philippines, 15
P. guineensis G. area, 845
rat, pos. h.c. presence in, 941
re. sub-species, 61, 34, 36,
S. 2, 1013
associated with *E. leprosum* hominis, 94
small discharge, 4
following chloroblasts, 644
treatment
 carbathion made 114
 carbo (meth)mercapto, 1147
 carbathylphenylmercapto, 1147
 chloroq. se. for resistance to emetine
 744
 conazole 365
 thio-racem, 1147
 W. 1011 1147
respiratory allergy associated with, 145
in Africa, culture, 10
complicating experimental work with
 E. leprosum in A. 470
natural infection of rats, 470, 941
odorant (Amato and, 1141)

- Enterobius*
critical review 70
diagnosis, cellulose tape method, 1071
the worm for dealing with, 746
re-infection and retroinfection distinguished,
 88
retroinfection in, 858
treatment see under *Enterobius crassus*
 larva infection

- Enterobius crassus*
pyradiculi and, 579 857
artifacts resembling or of 63
cause of or mistaken, 765
diagnosis
 mod. sed. reflex. see method, 857
disturbance 1071
ul. stoma

- in Durba 751
in Guinea, 376
A. 70
Port guine G. ca 848
Rome 1071

- molar infection, 941
retrofect. by 940
in for detecting in 761

- treatment
 Con. em. 941
 d. rhot. ca. rect. 1071
 exo. molar 0 846
 phen. h. r. m. c. 941 1164
 Rome 1166

- Enterobius*
Arona 641
Arona, pre- and *Enterobius* in 641
1. morphological Conference Commonwealth
 report, 978
1. morphological Conference Commonwealth
 report, 978
1. morphological Conference Commonwealth
 report, 978
1. morphological Conference Commonwealth
 report, 978

ENTOMOLOGY AND INSECTICIDES

GENERAL 979 121 177

87 79) 4 141 4 99 501

579 34, 677 4 4, 879 179

974 979 1071 1 17 1164

1164

- Entomophila*
primary
 accusant and, 104
 trop. ul. see also *E. leprosum* 7
 in Cuba, 877
 Curaçao, 87
 India, 1401
 Korea, 877
 accusant and, 77
 curator, 877
 Barrata and, 87
 treatment
 aromatics, 37

- Entomophila* long, 781
the common
 acetylcholine, 781
 muphosphate 781
respiratory syndrome, 577

- Entomophila*, primary
 in America 470
 Brazil, 470
 Rome, 470

- treatment
 aromatics, 1071 1071

- Epiderm* dropp, 94
Epiderm in *E. leprosum* infection 9
 S. 1077
Epiderm in *E. leprosum* in *E. leprosum* 9
 P. 1077

- E. leprosum*
 control of similar diagnosis (from leprosy)
 34
 and, 1071, 1071 (from leprosy) 37
 polymerization, 1071, 1071 (from leprosy) 37
 leprosy 37
E. leprosum and *E. leprosum* 1071, 1071 (from leprosy) 37
 leprosy and *E. leprosum* 1071, 1071 (from leprosy) 37
 one of red 41

- E. leprosum* type, 1071 in Curaçao 979
E. leprosum type, 1071 in Curaçao 979
E. leprosum type, 1071 in Curaçao 979
E. leprosum type, 1071 in Curaçao 979

- E. leprosum*
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979

- E. leprosum* type, 1071 in Curaçao 979
E. leprosum type, 1071 in Curaçao 979
E. leprosum type, 1071 in Curaçao 979
E. leprosum type, 1071 in Curaçao 979

- E. leprosum*
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979

- E. leprosum*
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979

- E. leprosum*
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979

- E. leprosum*
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979
 d. 1071 in Curaçao 979

Fasciola hepatica

as cause of tropical eosinophilia, 872
concentration of ova by continuous sedimentation, 950

drugs, action on, 760

experimental development in *Lymnaea stagnalis* 850

in a muscle abscess, (560)

infection

in Cuba, 271, (649)

France, (153)

Costa Rica, 153

Madeira, 62

Portugal, 62

Spain, 62

Texas, 62

from lettuce, 62

watercress, 62 1159

diagnosis, 271

CHR test in cattle, 1156

duodenal intubation (380)

family outbreak, 1159

prophylaxis 271, 272

treatment

emetine, 63

glucantime 1159

surgical, (380)

Fascioliasis, diagnosis by intradermal reaction, 760

Fasciolopsis buski infection

in Tonking, 153

man, 153

pig, 153

Fièvre rouge congolaise 459

FILARIASIS *see also* *Wuchereria* Loa,

Dracunculus *Dirofilaria*

in Anglo Egyptian Sudan 956

Aruba, 675

Borneo 67

British Cameroons, 563

Guiana 589, 654

Ceylon mosquitoes, 486

Costa Rica, 562

Ecuador, 573

Martinique 274

New Caledonia, 155

Porto Rico, 762

Portuguese Guinea 1013

Virgin Islands, 1066

allergy, 836

Bancroftian nightly parturition not proven, 274

of breast simulating carcinoma, 1064

chemotherapy of, 1161

control

in British Cameroons, 564

DDT 1066

elephantiasis and, 385

experimental, in cotton rat 488

of frogs, chemotherapeutic studies, 959

genital manifestations 155

malaria and yellow fever in British Guiana [GIGLIOLI] (book review), 183

Filariasis—cont

treatment

anthiomaline, 1162

arsenamide, 1164

cyanine dyes 1163

Hetrazan, 156, 562, 654, 855, 1064, 1065 1163

neostibosan, 1162

pentavalent antimonials, 1164

arsenicals, 1164

phenyl arsenoxide, 68

piperazine compounds, 1163

trivalent antimonials, 1165

arsenicals, 1162

tropical eosinophilia in, 67

tropical lymphangitis and, 274

with tuberculosis, 1068

Filaricides, cyanine dyes, 763

"Flagging method" of collecting *Trombiculid* larvae, 133

Fleas

control of diseases transmitted by, (501)

repellents, laboratory evaluation, (95)

of rodents in California, 630

South America, 291

toxicants, laboratory evaluation, (95)

Flies

blood-sucking

in Africa, Portuguese East, 531

Manitoba, 580

Portuguese Guinea, 531

as disseminators of *E. lusitana* 937

Folic acid

in macrocytic anaemia, 80, 81

pernicious anaemia, 80

sprue, 80

synthetic *see* Pteroylglutamic acid compared with liver extract in haematological response in sprue, 965

Food poisoning action of acetic acid on bacteria 830

Foréani, report of activities in 1946 and 1947 785

Fouadin *see also* Stibophen

Fowl as natural host of Echinostome in Java, 63

Fraxinus

chinensis in *P. vivax* malaria, 611

malleacophyla in malaria, 611

Fungal granulomata of man in the tropics and subtropics [REDAELLI and CIFERRI] (book review), 281

Fungicides

methods of analysis, (1089)

specifications, (1089)

Fungus diseases, need for study of 395

infections treatment of, in soldiers in the tropics, 1077

Furacin *see* Lactones

"Gambiae Eradication Service" in Egypt, 438

File: dm_bach_klavye_1-1800

- diagnosis
CLX concentration method, 1132
concentration method for ova, 53
faecal examination, direct concentration
methods, 1055
modified T lewis technique (AEXL 53)
examination of ova, modification of Self
method, 642
immunity ad, 80
incubation in Germany by irrigation schemes,
104
parasitic worms, (similar of, (466)

- Hydatid Disease [Dévé] (book review), 1099
 of the Bones [Dévé] (book review), 1099
 of bone, 383
 cardiopericardial, (65)
 cerebral, diagnosis, (382)
 of eye, (561)
 kidney 383
 liver, 382
 calcified cyst of, (65)
 cirrhosis and 1061
 lungs, (65) 382
 spleen, 383
 unusual sites 484
 vertebral, (382)
 complications and sequelae, 383
 Echinococcus cyst recurrence after marsupialization, (65)
 fluid, toxic action of, 851
 prophylaxis (1062)
 relation to biliary lithiasis, (485)
 renal, partial nephrectomy for, (1161)
 Roentgen picture, 382
 Second International Congress, at Buenos Aires 1160
 Hygiene and Tropical Diseases Institute, Mexico report (880)
 Morocco Institute, report for 1947, 1096
 Hygrophylla sp., larvae of mosquitotes and, 67
 Hylesia causing dermatitis in tropical America, 282
 Hymenolepis
 in animals at Rome Zoological Gardens, 179
 diminuta infection
 in Asmara rodents 1161
 Durban, 751
 Venezuela 273
 nana infection
 in Durban 751
 France, 951
 Venezuela 273
 returned soldiers 61
 var fraterna
 in Asmara rodents 1161
 Hypoderma bovis causing intra ocular myiasis 1179
 Hypsirrhina enhydria sparganosis and, 64
 Icosiella neglecta chemotherapeutic studies on, 959
 Impetigo in Calcutta 570
 Indalone as mosquito repellent, 1188
 India Public Health Commissioners report for 1946 982
 Indices of fascioliasis endemicity
 Cercarial index 272
 Hepatic-Fasciola index 272
 Malacological index 272
 Ova faeces index 272
 Inermicapsifer spp. discussion of life-cycle, 953

- Insects
 control
 in California, 174
 Central American Highway 441
 benzene hexachloride, 500, 879
 biological, 980
 chlordane, 500
 chlorinated camphene, 500, 524
 DDT, 500
 by aerial spray, 174
 from aircraft, (583)
 in military hygiene, 443
 plans for, in California, 500
 residual deposit tests, 501
 space spray tests, 501
 treatment of clothing 820
 insecticides
 action and chemical constitution, (412)
 (bis)
 aerial application, 172, 979
 chlordane, 500, 524, 613, 879
 DDD, DDT, chlordane and chlorinated camphene compared, 524
 DDT, (94), 613, 818, 877
 action on *Musca domestica*, 291
 analogues of, (411), 878
 biological activity of, (410) (bis)
 commercial, (94)
 compared with dichlorodiphenyl, 412
 dispersible powder, 438
 economic considerations, 332
 evaluation of residual effectiveness, 583
 medical and public health importance of, (583)
 method of assessing acaricidal properties of, 292, 293
 myiasis and in Guadeloupe 171
 preparation in laboratory (94)
 residual toxicity, 878, 897
 sorption by chitin 291
 type compounds, (1089)
 dispersal equipment, developments in, 708
 Gammexane 20, 613
 dispersible powder, 440, 613
 method of assessing acaricidal properties of, 293
 history of in the Army (1089)
 methods of analysis (1089)
 modern review of, 877
 parathion 412
 piperonyl butoxide, toxicity of, (584)
 recent developments, 979
 residual, Ross Institute Advisory Committee Bulletin, 879
 benzene hexachloride, 879
 effectiveness compared, 524, 525
 SNP 1131
 specifications (1089)
 spinning disk sprayer, 411
 sprayer for use in rural areas 411
 spraying improved methods, 1120
 testing proposed technique for, 404
 toxicity of mixed poisons, (293)

Lathyrus—cont*odoratus*

- nutritive value of, 399
- toxicity of, 399

sativus

- cause of outbreak at Vapniarka, 90
- nutritive value of, 399
- toxicity of, 399

sphaericus

- nutritive value of 399
- toxicity of, 399

sylvestris Wagneri

- nutritive value of 399
- toxicity of, 399

tingitanus

- nutritive value of 399
- toxicity of, 399

*Latrodectus**geometricus* in Argentina, 968*mactans* in Argentina 968

- bites by, cutaneous effects, 1169
- revivensis* characters of 1169

'Lazarine', definition of term 1053

Leishmania spp

- criteria of differentiation, 621
- nomenclature of, 621

Leishmania brasiliensis

in South America, 127

- donovani*, cultures effect of hyaluronic acid and hyaluronidase on, 549
- cultures, purification by antibiotics, 534
- electrophoretic studies on hamsters infected by, 925

preservation by inoculation of fertilized eggs, 1018

survival in *Ornithodoros moubata* 1018

in *Triatoma* 21

tropica in *Triatoma* 21

infectivity and immunity 449

LEISHMANIASIS (see also *Leishmania* spp)

21-22, 126-129, 242-244, 340-

343, 449-450 535-536, 621-

623 714-715, 815-817, 924-

926, 1018-1021, 1132-1134

in Africa East (1133) -

North 1132

Cercopithecus aethiops 815

Colombia, 622

hamster, effect of diet on

course 450

South America 127

canine

in China 129 342

Sicily, 128

cutaneous

in Abyssinia 343

Adriatic Coast, 1134

Arbruzzi 1020

Brazil 714

China 244

Costa Rica 342

French Sudan 816

soldiers returned to U.S.A., 777

Spain 126

United States of America 450

classification 342

diagnosis by culture 1020

10859

Leishmaniasis—cont

cutaneous—cont

epidemiology on Adriatic Coast, 1134

generalization, 714

resemblance to craw-craw, 816

leprosy, 1134

treatment

antimonials, 342

atebrin, 342

Bogalita, 926

eparseno, 343

Rongalita C, 926

sulphamide, 342

tartrac emetic, 816

kala azar

in America, 816

Bombay, 622

Calcutta, 242

China, 129

Dodecanese, (340)

India, 925

Punjab, 126

repatriate from Tunis, 340

Spain, 126 (*bis*)

Tunisia 341

United States ex servicemen, 340

activation by battle experience 21

of latent, by malaria, (15), 22

relapsing fever, (15), 22

acute endocarditis in, 340

anaemic syndrome in, (924)

delirium in, (924)

diagnosis

HCl gelification, 128, 1018

myelogram in, 1019

polycythaemia in, 242

purpura in, (815)

sero diagnosis 127

serum iron in 1018

spleen cells in 1019

splenogram in, 1019

target cells in, 1019

transmission by transfusion 341

treatment

glucantime (2168 R P) 341 622, 924.

1019

hydroxystilbamidine 1134

pentamidine isethionate, 925

splenectomy in drug-resistant cases 243

stilbamidine, neuropathy following 1133

urea stilbamidine, 815

without demonstrable parasites 1132

infantile

in Spain, 126 (*bis*)

Turkey, 21 (*ter*)

treatment by lomidine, 1020

muco-cutaneous in Brazil 343

treatment by eparseno, 343

Leishmaniasis Summary of Recent Abstracts

509-512

treatment

chloroquine, 623

Triatoma not a vector 21

vectors in South America 127

Leontitis nepetaefolia in control of asyrai

Leprosy—cont

in rats

- cultivation of organism, (375)
- effect of streptomycin, 375
- Stefansky's bacillus
 - action of promin on, 945
 - cultivation of, 1050
 - development in chick embryo, (945)
 - transmission to mice, 1054
- report of Calcutta Conference, 1948, 943
- reticulum in different types of, 1051
- serological reactions in, 944
- serology review, (369)
- simulated by cutaneous leishmaniasis, 1134
- social aspect of, in Brazil 1148
 - spotted" of Lucio, 1053
- staining tissues choice of fixative for, 478
- study of sputa of tuberculous patients, 1150
- Summary of Recent Abstracts 993-999 —
- Symptomatology of the Nervous System [DE SOUZA CAMPOS & BECHELI] (book review), 681

transmission, (477)

Treatise of, [MAURANO *et al*] (book review), 678

treatment

- advances in 52
- assessment of results, (372)
- Belivron, 50
- Bogalita, 944
- Caloncoba* seeds, oil of, 944
- chaulmoogra oil 370, 371
 - critical review of, (372)
 - long v short interrupted periods, 371
 - and promin compared 48
 - sulphones compared, 843
- diasone 48 372, 479 553 748 841
 - blood changes in, 480
 - shock symptoms after, 639
- Hydnocarpus (479)
 - oil, 48
 - preparations, optimum dosage of, 370
 - and sulphones compared 747
- hypospray, 51
- leprolines, 749, 750
- methylene blue for lepra reactions, 149
- of ocular lesions (51)
- physical therapy 265
- promanide 552
- promin, 48, 373, 479 552 748, 841
 - in laryngitis, 479 844
 - lepomatous type 479, 552 1053
 - neuromacular, 552
 - tuberculoid type, 479
 - and chaulmoogra compared, 48
- promizole, 49
 - in laryngitis 479
- streptomycin, 749
- and chaulmoogra 372
- sulphethrone 48, 553
- sulphones 47 48, (265) 372, 479
 - in French Guiana, 748 (*bis*)
 - bone changes under, 50
 - experimental work on, 747
 - importance of marrow examination, 47
 - risks in neuromacular, 943
- surgical, (1152)
- tracheotomy, indications for, 844

Leprosy—cont

treatment—cont

- vitamin D in large doses in tuberculoid type, 640

X-rays, 51

tuberculoid

- histology of cutaneous nerves, 1051
- a generalized condition, 370
- type defined, 840
- variety of lesions in, 149
- visceral lesions in, 370
- ulcer, perforating, of sole, 47
 - treatment, 48
 - by leprolines, 750
- welfare work, (750)

Leptopsylla segnis

- on rats in Mexico, 819

City 499

- reduction by dusting with DDT, 247, 347

Rickettsia burneti and, 541

- susceptibility to infection by *R mooseri*, 818

R prowazeki 818*Lepus californicus merriami* as reservoir host of *F hepatica* in Texas, 62

Lester Smith's crystalline antipericious anaemia factor, 166

Leucocytozoon in S Carolina birds, 616*sakharoffi* studies in Swedish birds, 615*simonidi* 615

Leucoderma in Calcutta, 570

Leucomelanoderma, diagnosis from leprosy, 369

Liberia, chief diseases of, 587

Lice

- control, 245
- of diseases transmitted by, (501)
- rectal feeding for *Rickettsia* cultivation, 1022

Lichen planus, atypical in Palestine, 868

*Liporhynchus**bacoti*

- experimental chemoprophylaxis 488
- on rats in Mexico, 819

City, 499

rearing in laboratory 387

reduction by dusting with DDT, 247, 347

transmitter of *R akari* in laboratory, 248*bursa* SNP as insecticide 1131*Litomosoides carinii*

- chemoprophylaxis of experimental filariasis, 488

effect of cyanine dyes on metabolism of, 1163

importance in filarial investigation, 1162

infection in cotton rats, 69

life-history of, 762

maintenance for investigation, 386

metabolism of, 763

migration of larvae, 959

test insect for filaricides, 763 (*bis*)

treatment

arsenamides, 68

Hetrazan, 156

Malaria—cont

- Rio de Janeiro, 513
- repatriated P O W 113 (bis)
- returned soldiers, 905
- accidental infection, 999
- activation by battle experience, 21
 - of latent kala azar by, (15), 22
- age-group infection in hyperendemic areas, 602
- allergic symptoms in, 519
- anomalous form at high altitude 1104
- Anopheline survey in Salerno, 8
- antimalaria drugs, (907)
 - criteria of tolerability 904
 - measures, modern, 1007
- associated with dysentery, 606
- avian
 - action of paludrine inhibited by pteroyl-glutamic acid, 1124
- in canaries
 - Plasmodium cathemerium*
 - exoerythrocytic development of, 1126
 - relictum in culture, 18
- in chicks
 - adrenal hypertrophy, 809
 - ascorbic acid in adrenals of infected chicks, 1011
 - Plasmodium elongatum* factors affecting exflagellation 335
 - gallinaceum*
 - acquired resistance to drugs 446
 - exoerythrocytic infection 334
 - infection
 - delaying action of proguanil, 911
 - infectivity of exoerythrocytic forms, 445
 - invisible stage of, 334
 - infection prophylaxis by proguanil, 911
 - sulphonamides 911
 - reaction of proguanil-resistant strains to sulphaguanidine, 912
 - staining of 95
 - juxtannucleare* exoerythrocytic schizogony, 447
- in ducks
 - Plaphuræ* infection
 - naphthoquinone in treatment, (115)
 - suppression of, by quinine 333
- chemotherapy of pre-erythrocytic stages, 106
- control
 - by action of antimalaria drugs on mosquitoes 909
 - Molinillo plant, 447
- exflagellation of parasites and mosquito immunity, 335
- pH values 335
- experimental quinoline studies 711
 - sulphonamides in (616)
- immunology of pre-erythrocytic stages 106
- plasma biotin and infectivity 446
- prophylactics
 - endochin 220 703
- role of body tissues in treatment, 1122

Malaria—cont

avian—cont

- tissue culture of erythrocytic schizogony, 107
- sex of host as factor, 220
- splenectomy and suppressant activity of quinine 1123
- treatment
 - action of drugs in stimulating immunity, 1123
 - quinine enhanced by splenectomy, 1124
 - cinchona alkaloids, 446
 - cinchonidine and quinine, synergistic action, 447
 - opsonin like action of drugs, 1123
 - role of reticulo-endothelial system, 1123
 - synergistic effect of chlorguanide and sulphadiazine, 119
- behaviour of parasites in preserved blood, 799
- benign tertian
 - among psychiatric patients in the Netherlands, 1108
 - complement fixation in, 1107
 - duration of infection, 1004
 - relapse
 - treatment
 - SN 7266, 1112
 - SN 8557, 1112
- and Blackwater Fever, Pathological Processes in [MAEGRAITH] (book review), 180
- blood transfusion and, 1002
- bone marrow affections and 519
- inhibition in, 606
- sludged, 12
- Bromeliads and, in Trinidad 320
- cerebral symptoms associated with
 - Pvixax, 433
- treatment
 - rationale of 1110
- chemotherapy 702 (bis)
 - and erythrocytic forms 105
- in children [ECKSTEIN] (book review) 881
- chronic
 - bone marrow reaction to, 1106
 - gastric secretion in, 321
 - treatment by pentaquine, 706
- cirrhosis of liver in 433
- congenital, 14 434, 1108
- control
 - in Amazonia, 331
 - the Army 216
 - Bolivia, 218
 - Bombay 16 17
 - California, 500
 - Chile 1008
 - China, 219
 - Cyprus, 807
 - Delhi 17
 - Georgia, 440
 - Hungary 896
 - Isle of Elba 316
 - Italy 217
 - Morocco 1008, 1097
 - Peru 1027
 - Sardinia, 117

Malaria—*cont.*control—*cont.*

b) action of a malaria drug in mosquitoes, 909

chloroquine, 54

coaxial amp drainage 1117

combined dust and spray for malaria and typhus, 7

DDT (09 440) 54 1008

barrier spray 1118

oil-mist tech. ques. 709

residual toxicity 441

in mosquitoes 19

dormant larvae, 19

Gammexane 54

Gyrod, 1008

irrigation and drainage, 1008

of *Anopheles* in Brazil, 11

larvivorous fish, (1008)

Malaria, 807

modern concepts in, 1114

paludine, 54

Panama Green, 807

problems and progress in U.S.A. 1118

prophylaxis, 54

pyrethrum, 908

SN 7618 54

delayed onset, suppressive drugs and, 19

diagnosis

clinical, (31)

complement fixation, 577

serological methods, 697

by spenic procedure, 700

scratching of, 518

duck as mosquito predator, 116

duration of infection, 1004

effect of attack on psychomotor symptoms, 1109

encephalic syndrome in, 901

epidemic

Finland, 1945 205

Kenya, 1940, 1104

Middelburg, Netherlands, 314

control measures, 315

Oran, Algeria, 877

Rumania, 1946, 1115

control measures, 1115

epidemiology

in China, 607

Italy during and after the War, 107

eradication

from Argentina, 332

U.S.A. proposals for, 440

erythrocytic schizonts types of, 791

erythrocytic cycle studies on, 8

erythrocytic problems, 799

experimental

effect of paludine on *P. malariae* 325

P. 54

prophylactic 325

50 years of war, 1007

Talaria and Yellow Fever in Brazil

Guinea (cont. 11) (book review) 111

forecasting epidemics in I.L.A. 697

in China, 601

high incidence, 999

Malaria—*cont.*

Hoeller et al. on reaction, with saprophytic (115)

intensity in children, possible forms of, 1113

imported, index of, 3...

incidence (forecast) in the Pacific 4

and 5 years in post-war period, 4

induced

complement fixation in, 110

serum proteins in, (105)

treatment by metachloride (SN 114172)

1111

in self and childhood, possible effects of, 1113

localized

epidemic of, 876

serum reactions, time of appearance, 901

in malarial

chloroquine intravenously 90

pentaga, 909

lecture 1114 report for 1947 787

International Congress at Washington, 1091

prophylaxis in, (112)

latent period prolonged, 111

Malay Union Advisory Board report, 54

malignant tertian, duration of infection, 1004

malaria and, 198

Munch reaction with aspirin dose, 1115

radio-irradiation in diagnosis, 911

value of during the war, 1903

congenital symptoms in 90

diagnosis in 90, (104)

in monkeys, 333

changes in blood pigments, 814

development of resistance to paludine, 709

ectoparasitic stages in, 1009

rate of sporozoites of *P. cynomolgi* in, 1122

hypersensitivity to malarial antigen, 576

Plasmodium cynomolgi life-cycle 441

hemolysis, 117

prophylactic use (CAM AQI 75)

treatment

paludine 19

mortality from, in Venezuela,

my. and leukemia and, 319

reaction in, 802

in two Society areas: 1787

serum in, 319

outbreak in Agre Rom. no. 1944 477

para (to liver threshold, 3)

rate

in Amazonia, 31

Belg Congo 601

children, 197

Curaca, 315

Marocco 1096

Portuguese Guinea, 1105

par. 1. 11

in blood, rapid form of, 96

erythrocytic form of 103-104

in placental blood, 699

peritome shock phenomenon 1

transmission

associated with CO glut. 17

Malaria—cont

- pathogenesis of, (605)
- pernicious attacks in childhood, 1003
- prognostic factors, 903
- persistent infection in returned soldiers 601
- petechiae in, 903
- plasmodia distribution in ethnic groups in Indo-China, 206
 - exoerythrocytic stages, 317
 - stain for, 413
- Plasmodium vivax* infection
 - development of immunity, 803
 - tolerance, 803
 - duration of, 605
- pneumonia, 114
- pregnancy and, 699
- premunition among Cambodians doubtful, 513
 - among Moïs of Southern Indo China, 206, 207
- prophylaxis
 - mepacrine, 217
 - paludrine, 216, 325, 329, 602 612, 705
 - recommendations for, 608
 - proguanil, 437, 706 806
 - recommendations for, 608
 - stream flushing 217
- provocative attacks of 13
 - and immunity 14
- psychic disturbances in, [GUNA M ORALES] (book review) 684
- quarrian, duration of infection, 1004
- quinacrine, synthesis of analogues, (437)
- rainfall and, 6
- relapse, 13
 - in Batavia, 901
 - constitution and (323)
 - after paludrine 213 705
 - inhibition by tetanus toxoid 1112
 - P. falciparum* 13
 - P. malariae* 13
 - P. vivax*, 13
 - treatment
 - chloroquine 905
 - mepacrine, 905
- treatment
 - atebrin 901
 - paludrine 701
 - quinine 901
 - and pamaquin 606 701
 - plasmoquine (114) 902
 - quinine substitutes 701
- weather and 13
- research in North Borneo (909)
- reticulo-endothelial system in 320
- rice cultivation and in Venezuela 211
- simulating appendicitis 1108
- soil erosion and 116
- spleen rate
 - in Amazonia 31
 - Burma 210
 - Corsica 315
 - India 109
 - Portuguese Guinea 1105
 - Punjab 110
 - Tjandjoer Dutch East Indies 110
 - Veracruz, Mexico 898
- rupture spontaneous 113

Malaria—cont

- splenic index
 - in El Salvador, 6
 - Mexico, 429
 - Middelbourg epidemic 314
 - Szechuan, 428
 - Veracruz, Mexico, 898
- subtertian
 - acute abdominal symptoms in (434)
 - grey hepatization after, (434)
 - prognostic value of parasite counts in untreated cases, 1107
- Summary of Recent Abstracts 195-204, 301-314
- suppressants, 612
 - chlorguanide, 612
 - chloroquine, 612, 1006, 1116
 - diphosphate 707
 - comparison of drugs 1008
 - neo premaline, 1116
 - paludrine, 612 806, 907
 - pentaquine, 1116
 - quinacrine 1005
 - SN 6771 1007
 - sontochin, 1006
- survey in Lower Bengal, 109
- Macedonia and Thrace 316
- swamp cultivation and increase of in Uganda, 9
- synthetic antimalarials (611)
- therapeutic, 14
 - comparative susceptibility of patients, 321, 322
 - physiological studies in man 801
 - preservation of plasmodium by freezing, 430
 - risk in Anopheline-infested areas 427
 - treatment by paludrine 703
 - transference by preserved blood 1002
 - transmission *Kerteszia* in Brazil 332
- treatment
 - acridine derivatives, (435)
 - advantages of high initial doses 434
 - amidines (706)
 - antimalarial drugs, summary of 1109 1110
 - field trials in Egypt, 435
 - studies (806)
 - antimalarials antagonistic to adenosine, 522
 - atebrin *see* mepacrine
 - benzimidazoles structure and antimalarial activity, (437)
 - CAM-AQI *see* camoquine
 - camoquine 435 436, 610, 611, 702 1110
 - chinoplasmine, 1109
 - side-effects, 1109
 - chloroquine 214 435 (*bis*) 436 521, 610 (*bis*) 702 805 905 1006, 1110
 - diphosphate 707
 - isopentaquine 702
 - "Kiniplex" 1109
 - mepacrine 214 436, 702, 904 905 1104 1109
 - and pamaquin 705 1116
 - psychoses attributed to 607
 - metachloridine 214
 - metoquine, *see* mepacrine

- Ornithobilharzia* sp., infection of cattle in Szechuan 647
- Ornithodoros* sp
transmitter of *Sp. naganophila*, 43
- Ornithodoros*
canestrinii
experimental transmitter of *S. microti* 1049
transmitting *S. microti* 44
coniceps
in France, 410
human infection from pigeons 410
erraticus
in Iran, 43
South Morocco, 43
transmitter of *Sp. crocidurae* 43
Sp. merionesi, 43, 836
vector of relapsing fever spirochaetes in W Africa 1046
- lahorensis*
in Anatolia, 352
experimental transmitter of *S. microti* 1049
transmitting *S. microti*, 44
- monbata*
intracoccal inoculation with Rickettsiae, 624
toxicity of neoarsphenamine effect of BAL on 675
- normandi*
in South Tunisia, 43
transmitter of *Sp. normandi* 43
- tartakowsky*
in Usbekistan, 44
transmitting *S. latyschevi* 44
- tholozani* and transmission of *S. microti* 1049
- tolidor* SNP as insecticide 1131
- Oroya fever *see* Bartonellosis
- Oscinis pallipes*, distribution and name of (876)
- Otitis caused by *Enterobius vermicularis* 765
- Otobius megnini*
in California, 252
vector of Q fever virus, 252
Ovalocytosis and the sickle cell trait 1075
- Oxychloroquine, tolerance of, 904
- Painful feet " in deficiency disease, 72
- Palm leaf traps for snails in Egypt, 646
- Paludrine *see also* proguanil
activation of, by rat liver, 335
benzimidazole analogues of, (114)
cerebral malaria, reasons for failure in, 1110
inhibitory action on gastric secretion 325
(*ter*)
mode of action, 335
pharmacology of, 327
- Pan American Sanitary Bureau activities in Central America 441
- Pandanus* mosquito breeding and 172
- Panstrongylus*
diasi in Brazil, 125
geniculatus in Brazil, 125
megistus in Brazil, 125
natural infection by *T. cruzi* in Brazil, 125
vector of *T. cruzi* in Minas Gerais 620
- Papio sphinx*, *Watsonius watsoni* in 482
- Para-aminobenzoic acid in experimental typhus, 246
- Paracoccidioides granuloma *see also* Blastomycosis
in Brazil, 284
- Paracoccidioides brasiliensis*
ano-rectal localization, 84
cerebral tumour caused by, 1081
fluorescent staining, 571
infection, (167)
of anus 283
mouth 283
vaccine for Blastomycosis, 168
- Paragonimiasis
pulmonary in Philippines 649
X-ray appearances, 1055
treatment
emetine hydrochloride, 649
experimental in dogs, pathological changes, (950)
tartar emetic 649
- Paragonimus* spp
in dogs in Szechuan 376
infection in Philippines, 152
- Paramoecium caudatum* for testing antivenin titres 568
- Paramphistomum cervi* concentration of ova by continuous sedimentation 950
- Paraplegia from intraspinal coenurus 65
- Parasites
in blood of birds in S Carolina, 616
mammals in Rome Zoological Gardens, 179
rodents in Asmara, 1161
intestinal
in Addis Ababa 1032
Colombia, 1055
Gabon estuary, 844
Guayaquil hospital patients, (376)
school-children, (376)
Portuguese Guinea, 844
detection
AEX method 53 642
Faust's method 643
Stoll's method 643
Willis-Mallory method, 643
- Parasitological
studies in Venezuela 505
survey of African school children in Nairobi, 432
- Parasitology, Bacteriology, Haematology and, [STITT] (book review) 185
reflections on 987
Manual of Medical with Technique for Laboratory Diagnosis [ZELIFF] (book review) 194

Plasmodium

- suspected cases, merozoites of, in
 Campbell Hospital, Calcutta, 34
 type in in S. in Africa 31
 transmission
 monkeys 1 P. in relation to 34
 rats in relation to, 34
 P. falciparum in Madagascar 357
 A. nuptialis group
 food 3 monzoites in ecology of, 3
 survival on young 3 adult roach, 31
 treatment
 new drugs, (186)
 serum, 934
 streptomycin, 35 345 934
 sulph. diazine 35
 sulphamethazine 35
 sulphonamide drugs, 35 934
 vaccines
 Haffkine Institute's, assessment of, 35
 A. nuptialis group, experiments with mice, 31

Plasmodiidae, new classification of 1156

Plasmodium

- also see also *P. falciparum*
 vector *P. falciparum* in Belgian Congo, 1157
 host 1
 ecological requirements, 946
 methods of packing for transport, 946
 chromophila
 characteristics 1, 1157
 vector *P. falciparum* in Belgian Congo, 1157
 cone effect of copper salts on, 966
 defeciti
 control
 RHC and copper sulphate compared, 1017
 vector of *S. haemaphysorum* in Portugal, 1056
 quadrifasciatus see *Antennophora glabrata*
 perferens, characteristics 1 1157
 monile, characteristics of 1157
 vector *P. falciparum* in Belgian Congo, 1157
 large kinas
 characteristics 1 1157
 vector *P. falciparum* in Belgian Congo, 1157

Plasmodium, mosquitoes and other inhabitants, 173

Plasmodium

- erythrocytic forms, se. rich for 429
 types of, 31
 human
 development in monkey, 429
 infect in rats in monkey 4
 parasitological studies of the genus, (297)
 relationship to *Haemaphys* 99
 Leucocytium 99

Plasmodium

- erythrocytic phase, 798
 lifecycle in the canary 1176
 344 from it wanted to the dark 120
 infection
 treatment
 radiation, 420
 circum 1
 in S. Carol on birds, 616
 chromophila
 development of resistance to paludrine in
 effect of paludrine on, 19
 erythrocytic phase 798
 stages in *Alar macula*, 1009
 fate of parasites injected into monkeys, 1156
 lifecycle 443
 pre-erythrocytic, see, 104
 chromophila
 development of 798
 in S. Carol on birds, 616
 falciparum
 action 1, white on, 700
 storage in C on, 5 1
 plasmodium on 700
 see, see on, 700
 protein 1, protein of CL, 1156, 104
 effect 1, drugs on monkeys infected with 109
 5N 7611 on, 415
 erythrocytic forms of 797
 in maternal monkey in, 92
 in placental blood, 899
 in placental infection in 1 space 634
 paludrine series 1 1 7 1, 1113
 parasitological in progress 1, 1107
 physiological studies in induced infections, 701
 prophylaxis 1 prophylactic in peritoneal infection, 325
 prophylaxis
 prophylaxis, use of 700
 schizonts in the skin of African children, 7
 activity of New Guinea 1156
 paludrine 1111
 series 1 in preserved blood 799
 stability preserved blood, 103
 infection on
 in Belgian Congo 14 101
 children, 817
 C. 1156 343
 Central Africa 1, 428
 Coch. Africa, 378
 1 1 1 1 1
 1 1 1 1
 Indochina 1 1 1
 K. 1 1 1 1 1
 N. 1 1 1 1 1
 O. 1 1 1 1 1
 P. 1 1
 Portuguese Guinea 1173
 S. 1 1 1
 Spain 427
 S. 1 1 1
 S. 1 1 1
 S. 1 1 1

Plasmodium—cont*falciparum*—cont

infection—cont

inhibition of relapses by tetanus
toxicoid 1112

in hospital patients in Nairobi 1104

simulating appendicitis, 1108

suppressant action of paludrine, 806

treatment

CAM—AQI, 436, 611

nivaquine and paludrine compared,

705

paludrine, 705

'Palusil', 436

gallinaceum

acquired resistance to antimalarials, 446,
910

adrenal hypertrophy in infection by, 809

course of infection in embryo ducks, 808

effect of cinchona alkaloids on, 447

dichroline on, 615

humidity on oöcysts, 710

temperature on oöcysts, 710

tissue extracts on 909

sex of host, 220

erythrocytic forms and changes in life-
cycle, 108

exoerythrocytic forms, infectivity of 445
phase, 798

glucose consumption in culture, 1011

metabolism, effect of quinine on, 445

mode of action of drugs on, 1123

pre erythrocytic development in chick
embryos, 809

resistance to paludrine, 118

sulphadiazine 119

staining of, 95

synergistic action of chlorguanide and
sulphadiazine against 119

infection treatment by endochin, 220

hexamerium in S Carolina birds 616

juxtannuleare exoerythrocytic forms in the
fowl 447

knowlesi

action of CAM—AQI 787

chloroquin 787

antigens for testing hypersensitivity in
monkeys 526

blackwater fever and, in monkeys, 810

blood pigment changes caused by 614

metabolism of, 117

Plasmodium knowlesi infection

effect of blood and oxygen on experi-
mental 333

electrocardiographic changes in 1121

treatment by endochin 221

lophurae

acquired resistance to drugs 446

effect of blood and oxygen on experi-
mental infection, 333

dichroline on 615

infection of inoculated mammalian
erythrocytes in chicks 912

latency of infection in chickens 808

10859

Plasmodium—cont*lophurae*—cont

relation of infectivity of ducks to biotin
content of plasma, 446

treatment by naphthoquinone, (115)

malariae

in placental blood, 699

life-history experimental study, 431

susceptibility of chimpanzee to human
parasite, 443

infection

in Belgian Congo, 214

children, 897

Cape Verde Islands, 208

Central Africans, 428

Indo-China, 206, 207

Kenya highlands, 898

Kigezi, Uganda 10

Nairobi children 432

Spain, 427

Szechuan, 428

infection

treatment

quinacrine 904

quinine, 904

ovi in S Carolina birds 616

ovale

in placental blood, 699

infection

in Beirut Lebanon, 1109

Eritrea, (696)

treatment

quinine and mepacrine, 1109

relictum

effect of cinchona alkaloids on, 447

persistence in culture, 18

infection

in Algerian sparrows, 448

S Carolina birds, 616

effect of dichroline on, 615

treatment by endochin, 220

vassalli

exoerythrocytic development of, 808

acquired resistance to paludrine 609

action of atebirin on 700

nivaquine C on, 521

plasmoquine on 700

quinine on 700

blood transmission and elimination of
gametocyte production, 317

chief cause of malaria endemic in China,
603

exoerythrocytic forms of, 797

negroes more resistant than whites to in-
fection 322

pernicious attacks of, 897

physiological studies in induced infection
801

placental blood and, 699

predilection for reticulocytes 899

pre-erythrocytic stages of 104

pneumonia, 114

survival in preserved blood, 799

tolerance not strain-specific 803

viability in preserved blood, 1003

Pharmacokinetics

in children

- in C. leiria, 325
- Cape Verde Isl., 328
- Central African, 428
- Czechoslovakia, 343
- Egypt, 15
- France, 11, 645, 1101
- India-China, 20, 207
- Italy, 1184, 116
- Kerry, 1184, 272
- Norfolk children, 43
- Northern Mexico, 474
- Paris, 11
- Poland, 1000
- Sardinia, 117
- Spain, 477
- Sweden, 205
- Switzerland, 428

complement fixation, 1107

congenital, 1108

effect of SN, 618 on, 435

induced

treatment by methacholine, 1111

inhibition of relapse by, 1111

relapse, 1111

relapse, per cent of, 701

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

relapse, 1108

Pharmacokinetics in children, 1107

Pharmacokinetics

Pharmacokinetics in children, 1107

Pharmacokinetics

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Pharmacokinetics in children, 1107

Quinine, estimation of excretory, 520

injection, risk of tetanus, 212

tetanus after injection, (520)

Rabbits as reservoir hosts of *F. hepatica* in Texas, 62

RABIES, 139-142, 253-255, 356-357, 459-460, 543-545, 728-736, 824-825, 933, 1028-1029, 1139-1143

in Corsica, 728

Ecuador, 573

Mexico, 1139

Turkey, 139

Uruguay, 140

bat

in Mexico, 254

Trinidad, 254

in a calf, 139

canine, (357)

in a cow, 255

foxes 1028

man from rat-bite, 731

complement fixation, time of development, 1029

control

in Corsica, 728

Uruguay, 140

Bolivar virus, 824

Maturin virus, 824

diagnosis

from filariasis in dogs, 139

stain for Negri bodies 139

domestic animals from foxes in Corsica, 728

epizootic in Alaska, 1028

experimental studies, (1140)

infection *via* mucous membranes, 139

without a bite 139

Negri bodies, new staining method for 1141

neuro-paralytic accidents

pathology of 1142

prevention by addition of serum, 735

paralytic

in Trinidad fruit-eating bats and 254

Venezuelan cattle, 824

control in Venezuela, 824

report of Pasteur Institute, Paris, 736

treatment

benzene ether extracted vaccine 732

effect of menstruation 731

ovarian function, 731

failure of 356

neuro-paralytic accidents after, 1142

prevention of 733

report of Pasteur Institute for 1947 (140)

surgical, 732

vaccine benzene inactivated 733

vaccination, absence of infection among

vaccinated dogs 141

effectiveness of 544

encephalitis after 543

failure of 544

vaccine

allergy 933

antibody response to, 1028

Coonoor 588

effects of phenol and formol compared

140

water in-oil emulsion immune response to,

140

Rabies—cont

virus

antibiotic action of *B. mesentericus*, 1141

carriers, 729

chick embryo culture characteristics, 1140

pathogenicity, 1140

infection, 1140

cultivation of, 1028

in blood of developing chick embryo, 253

invasiveness of strains, 460

spreading effect of saliva, 729

factor due to hyaluronidase, 729

varying antigenicity of strains, 460

virulence enhanced by hyaluronidase of

dog's saliva, 1141

virus fixe,

propagation in brain of guinea pig foetus,

140

Railletna

alouattae

in *Alouatta macconnelli* in Surinam 951

demerariensis

in *Alouatta seneculus* in Surinam, 951

equatoriensis 272

infection in Ecuador, 272

symptoms, 272

Rana

guntheri sparganosis and, 64

limnocharis

intermediate host of *Diphylllobothrium*

mansoni 560

sparganosis in, 64

tigrina

intermediate host of *Diphylllobothrium*

mansoni 560

sparganosis in 64

Randia as molluscicide 266

Rat(s)

absence from Alberta Province Canada, 142

census of in Baltimore 825

control

rodenticides, (501) (*bis*)

ANTU 461

arsenic trioxide 461

barium carbonate 462

sodium fluoracetate 461

strychnine sulphate, 462

thallium sulphate, 461

zinc phosphide, 461

ectoparasites

control by DDT, (256)

indices (256)

in Mexico City 499

Poland ports, 1144

in Texas, 818

Malayan, identification, 245

poison

ANTU 358

DDT, 929

red squill 358

"1080" 358

Rattus

exulans, in Rangoon, 256

- Rickettsiae, *see also* under Typhus
 antigenic relationships, 353
 cotton rat suitable for experimental work 817
 cultivation in lice, 1022
 experimental infection, inhibitory effect of anti organ sera, 244
 rabbit lung suspensions as antigen, 539
 infection
 treatment by penicillin, 246
 vaccines enhancement by water in oil suspensions 819
- Rickettsial Diseases of Man [SOULE and MOULTON] (book review), 590
- Rickettsialpox, locality records, 1025
- Ringworm in Calcutta 570
- Rockefeller Foundation, International Health Division Report, 1947 299
- Roquessin *see* Conessine
- R P 3038 *see* Nivaquine C
 3377 *see* Nivaquine B
- Rural Hygiene, Problems of in Brazil [PESSÔA] (book review), 1191
- Salicylic acid for impregnating clothes against typhus mites, 540
- Salmonella typhi cause of endocarditis in kala azar, 340
- Sandflies *see* Phlebotomus
 of North Ceylon, 974
- Sanitation, Tropical, Manual of [BALFOUR KIRK] (book review), 1102
- Sapindus extract as molluscicide, 266
- Saponin in staining blood parasites, 502
- Sarcocystis muris in rodents of Asmara, 116L
- Sarcophaga
 fuscicauda causing myiasis 286
 misera sarracenioides and transmission of E histolytica 937
- Scabies in Calcutta, 570
- Scapanus townsendii infection by Coccidioides 496
- Schistosoma
 haematobium in cerebral granuloma, 378
 diagnosis by bladder biopsy 56
 experimental infection by Physopsis africana, 150
 extracapsular oviposition 752
 hatching speed of miracidia, 55
 infection among East African tribes, 555
 prevention of, 151
 lesions in bladder, 56
 life cycle experiments 151
 ova in lungs 57
 rectum, 847
 irregularity of excretion 555
 relation of output of ova to exertion, 556
 self infestation
 ova in semen 553
 treatment by fuadim, 554
 theory of oviposition 946
 infection
 treatment
 anthiomaline, (377)

Schistosoma—cont

- intercalatum, pulmonary symptoms in infestation by, 58
- Japonicum
 action of immune sera on cercariae of S mansoni 55
 in cerebral granuloma 378
 maintenance in laboratory, 1158
 morphology of, 270
 ova, optimum hatching conditions, 950
 in returned soldiers, 61
 snail hosts of, 559
- mansoni
 action of immune sera on cercariae of, in vitro, 55
 antigen for intradermal reactions, 757
 biological studies of the miracidium, 377
 cercariae for CHR test, 1155
 chromosomes and sex in, (1058)
 diagnosis by rectal biopsy, 57
 effect of chloramine on miracidia, 647
 Miracid D on, in vitro 753
 experimental infection of Australorbis glabratus, 150
 in mice, treatment by antimonials, 646
 hermaphrodite strain, 55
 hyaluronidase in cercariae of, 56
 infestation clinical evolution of, 377
 rare in South Central Africa, 378
 laboratory animals as experimental hosts of, 948
 life-cycle experiments, 151
 methods of infecting mice 948
 ova in bladder 847
 lungs, 57
 wall of gall-bladder, 1060
 pathological effects from infestation by males in China, 756
 rudimentary female embryos in 1058
 structure of body covering, 1154
 vector in Maracay, ecology of, 756
- Schistosomatium douthitti
 cause of dermatitis 849
 swimmers' itch, 849
- Schistosoma(s)
 cercariae
 study of penetration by, 949
 varnish to prevent penetration, 151
 dermatitis
 in U S A , 849
 Washington, 1061
- SCHISTOSOMIASIS
 in Africa Central 846
 East 555
 Cairo, 643
 Celebes, 59
 Chengtu plain 648
 China, 60
 Dominica 558
 Durban 751
 Egypt, 57 150 845
 Espirito Santo 643
 Iraq 554
 Japan Eastern, 482
 Kenya, 151
 Nairobi children, 432

- Scleroma**
 in Mexico, 970
 Panama, 872
 Sierra Leone, 403
 geographical distribution 872
 pathological stages, 970
 treatment, 872, 970
- Scopularopsis** liable to confusion with *Coccidioides immitis* 1174
- Scorpio maurus**
 in North Africa, 280
 stinging by, in Palestine, 867
 treatment by antivenene, 280
- Scorpions**
 of North Africa, 280 868
 Palestine 867
 effect of DDT on, 493
- Scorpionism** by *Brachistosternus chrenbergi* 394
- Scrub typhus** see Typhus fever mite borne
- Selenium** as cause of lathyrism, 170
- Sepsidae**, coprophagous, biology of, 404
- Shigella**
boyd causing dysentery in S Persia, 633
flexneri causing dysentery in S Persia, 633
schmitzi causing dysentery in S Persia, 633
shigae causing dysentery in S Persia, 633
sonnei causing dysentery in S Persia, 633
- Sicklaemia** without anaemia (280)
- Sickle cell**, blood donors with, 1169
- Sierra Leone**, peasant community, vital statistics of 586
- Signe en brosse** in sickle cell anaemia 967
- Simaruba officinalis** see also Carobinase
- Simuliidae**
 of Anglo Egyptian Sudan, (387), 404
 Belgian Congo, 387
 Chiapas Mexico 564
 Madagascar, (1088)
 Manitoba 581
 Mexico identification of 407
 new species in, (876)
 Queensland 406
 control in Central America, 442
 DDT, 583
 Gammexane 583
Gigantodax 407
 wing venation, 171
- Simulium** spp, vector of *T. carateum* 869
adersi in Anglo-Egyptian Sudan, 404
albivirgulatum, development of *O. volvulus* in, 387
alcocki liehnrardi in Anglo Egyptian Sudan, 404
bovis in Anglo Egyptian Sudan 404
callidum and onchocerciasis in Mexico 564
 vector of onchocerciasis in Central America, 565
cervicornutum in Anglo Egyptian Sudan, 404
darniosum
 in Anglo Egyptian Sudan, 404
 Belgian Congo, 387
dentulosum in Anglo Egyptian Sudan, 404
- Simulium**—cont
griseicollis
 in Anglo-Egyptian Sudan, 405
 Belgian Congo, 387
impukane in Anglo Egyptian Sudan 405
lepidum in Anglo Egyptian Sudan 405
menialoni in Anglo Egyptian Sudan 405
medusaeformis in Anglo-Egyptian Sudan, 405
metallicum
 and onchocerciasis in Mexico, 564
 vector of onchocerciasis in Central America, 565
neavei, vector of onchocerciasis in Kenya, 854
nigritarsis in Anglo-Egyptian Sudan, 405
ochraceum
 and onchocerciasis in Central America, 565
 Mexico 564
ornatipes in Queensland, 407
ruficorne in Anglo Egyptian Sudan 405
sibirica (*Mallochianella sibirica*), 407
unicornutum in Anglo-Egyptian Sudan, 405
- Siphonaptera** of South America 291
- Siphunculina signata*, possible vector of epidemic conjunctivitis 1082
- Skin**
 diseases in Calcutta, 570
 schizogony of *Plasmodium falciparum* in, 7
- SN 5241**, skin reactions from use of, in malaria, 1111
- 7618 see Chloroquine
 11,437 see metachloridine
 tolerance of in malaria 904
 12 080 see Colchicine
- Snails**
 control in streams
 palm leaf traps, 646
 molluscicides
 copper sulphate, 266
- Snakes** (see also under Venoms)
 of Argentine, 967
 of French Equatorial Africa, 967
 Peruvian, observations on, (81)
 San Luis Potosi, Mexico, (866)
- Snake-bite**, 568, 967
 in the Sudan 866
 malnutrition and, 866
Bothrops spp in Argentine, 967
Crotalus terrificus in Argentine, 967
Eupalaestrus two new species, (81)
Micrurus
corallinus in Argentine, 967
frontalis in Argentine 967
lemniscatus in Argentine, 967
Pamphobeteus Brazilian species study of, (81)
 Trichomonad, new, in (146)
Trimeresurus new species (81)
Trimeresurus mucrosquamatus cantor bite by, 568
- SNP**, toxicity for bugs and ticks, 814, 1131, 1188
- Social Welfare** Services in Morocco, 1947, 1097

- Sodium* carbonate error note 54
Sodium cyanide present in soil control, 116
S. luciae in de tropical ep. palm-leaf 1177
Synophrasma see *T. trypsinum*
Sporoglyphus and its larvae of
meqy notes 1 67
Sp. garson
 French Equatorial Africa, 761
 India-China, 64
Sp. from parasites 1 448
Spengler-Sybel method of staining germinules of
 M. leprosa 84
Sp. Jernike
 in Chile 116
 Uruguay 1076
Stenobothrus macton
 preventive, (1076)
 treatment, (1076)
St. oerles
 p. gene of skin from, 1076
 haemoglobin from, 1076
 haemoglobin from, 10 6
Strickland p. *St. oerles* effect of 1169
Sp. virens as germ in *Stechus* dogs
 376
Sp. virens
 disease
 house color 471
 locality of str. in Belgian Congo 836
 mould near date of house trans-
 mission, 1049
St. virens
 transmitted by *O. virens* 44
 in Uzbekistan, 44
St. virens in
 in South Morocco 43 836
 perennial infection of *Macar* 1 one,
 836
 in Iran 836
St. virens
 in Iran, 43
 experimental infection of rodents, 1048
 transmission by *O. virens* 44
 O. virens, 44
 natural infection of *T. virens* and *re*, 1048
 transmission by *P. virens* humerus 44
St. virens, 43
 non-retroviral-microsome study of 836
 herm. in *Sp. virens*
 protein
 in Iran, 43
 Thruak and Palestine strains compared,
 4 1
 course electron-microscope study 1
 835
 species isolated from the *Perla* gerbil,
 (Tater note 1 26)
Spirichacter
 in North Africa and India 1
 4
 red 1 44
Sp. virens, known of in the tropics, 1048
Sybian bacteria primary in *R. virens* 5 4
Sp. virens in *St. virens* infection known, 1076
- SPURT 77 77 280 791 792, 8 8 1 79
 791 841 842 843 844 1073
 in India 791 841 842
 Italian penicillin of *re* 4 8
 Porto Rico 3 1
 Venezuela, 79
 biological / *re*, 791
 anemia
 effect of infection of animal protein factor
 (note 1 1073)
 megakaryocyte
 the times by *St. virens* and *re*
 treatment
 strain B 167
 parenteral, 844
 clinical features 458
 criteria of progress, 841
 cyclic infection, (84,
 diagnosis, 79 770
 faecal flora and fatty acids, determined in of
 640
 f. l. acid deficiency in, 841
 dose in, 641
 in cultivation diets in, 841
 non-tropical
 treatment by folic acid, 77
 p. *St. virens* (458 791 844
 prognostic features, 845
 protein synthesis of gastric rate and 1073
 symptoms, 845
 the toxin
 diagnosis, 641
 folic acid, 77 771
 and liver extract compared, 845
 leprosy, 7
 in *re* 640
 mode of action, 84
 sulphaguanidine 640
 symptoms, 791
 the strain 80 79
 strain B 391 344
 virus deficiency in, 641
Staphylococcus
marginatus palata, *re* of *re* and
 causing symptoms such 847
pal. virens effect of culture causing
 symptoms (ch 841)
Staphylococcus bacillus in *St. virens* in *re*
 infection (in *St. virens* 1147)
St. virens in the event of endotoxin 114
St. virens and *re*
 effect of *St. virens* on 916
 p. *St. virens* of 916
St. virens (focal in internal *re* in
 57
Streptococcus *re* *St. virens* *St. virens* in
Streptococcus
 in *re* on cultures of *St. virens* 547
 and the *St. virens* combined in *St. virens* 177
 in tuberculous leprosy patient 1152
Streptococcus
 stage *re* 1 infection of the *re*
 endotoxin in 1154

- Strongyloides stercoralis*
 in Gabon estuary, 844
 Portuguese Guinea, 844
 returned soldiers, 61
 clinical manifestations of infection with, 383
 creeping eruption due to, 652
 development stages, 650
 eruptions associated with, 652
 infection among ex-prisoners of war, 651
 causing "bathing-drawers" eruption, 652
 larvae in unusual sites, 383
 lesions due to, 651
 sanitary problem in Brazil 853
 treatment by gentian violet 383
- Strongyloidiasis**
 diagnosis
 antigen for, 955
 intradermal reaction 955
 precipitin reaction 955
- Sulphabiguanide derivatives in malaria (114)**
(bis)
- Sulphadiazine in toxoplasmosis 1185**
- Sulphamerazine in toxoplasmosis, 1185**
- Simus caeruleus* in Rangoon 256**
- Sunlight, cutaneous response to 569**
- Soramin**
 estimation in blood 337
 plasma, 338
 serum, 337
 in treatment of Onchocerciasis, 855
- Survey Demographic, of the British Colonial Empire Vol I West Africa [KUCZYNSKI] (book review), 508**
- Surveys see Reports and Miscellaneous Papers**
- Swarming gnat of the Sudan see *Oscinus pallipes***
- Swimmers' Itch due to non human cercariae 849**
 in Washington 1061
- Sword bean dermatitis 73**
- Sylvilagus floridanus* as reservoir host of *F. hepatica* in Texas 62**
- Syphilitic roseola, diagnosis from leprosy 368**
- Tabanidae* of Manitoba, 581**
- Tabanus* spp as vectors of disease 875**
- Tabardillo see Typhus Group of Fevers**
- Taeniasis in Nairobi children, 432**
- Takata-Ara test in cirrhosis of the liver 161**
- Tanganyika Territory**
 Native Authority Dispensary System 99
 Report on water resources 676
- TAPEWORM INFECTION**
 in Durban, 751
 Portuguese Guinea 844
 extracts causing cutaneous manifestations 653
 immunity to 380
 10859
- Tapeworm Infection—cont**
Diphylobothrium in Kenya, 70
erinacei immunity, 380
latum infection
 anaemia
 bone marrow picture, 483
 treatment
 folic acid 154
 liver, 483
 immunity, 380
mansoni plerocercoids in animals in Indo-China, 64
Hymenolepis infection
diminuta premunition, 381
nana immunity to, 381
 var *fraterna*, immunity, 381
Inermicapsifer infection
arviculidis
 human infection in Kenya 952
 rodent hosts of, 952
cubensis in Cuba, 952
Ligula intestinalis, premunition, 380
Taenia
hydantigena in dogs in Szechuan 376
saginata infection
 in Kenya 641
 Portuguese Guinea, 844
 Scioa 1033
 Tropical Africa, 65
 Venezuela 273
 premunition 380
 treatment
 atabrin 650
 appendicitis and 578
 ova
 effect of sand filtration on, 851
 sewage sedimentation on 851
 sludge on 851
 proglottides in appendix, 65
 toxic extracts from 851
solium infection
 in Portuguese Guinea 844
 Scioa 1033
 Venezuela 273
 premunition 380
 treatment
 atabrin, 650
- Tarsonemus* and tropical eosinophilia, 577**
- Tatera indica* natural infection by *S. microti* 1048**
- Tenebrio molitor***
 in man 1089
 larva infection by Rickettsia 451
- Tephrosia* leaf as molluscicide 266**
- Termites maintenance of cultures in the laboratory 975**
- Teropterin in treatment of sprue 391**
- Thalazia callipaeda* in dogs in Szechuan, 376**
- Thiophosphate o diethyl o"paranitrophenyl see SNP**
- Thromboangitis obliterans in Gold Coast woman, 873**
- Thrombophlebitis, tropical as causation 1086**

Trypanosoma in S. Carolina birds, 616

insect

in Gambia, 229

Africa, West, 22.

attempts to infect man experimentally 813

diff. between *Trypanosoma* (14)

differentiation (1812)

effect of trypanicide on, 339

ultrastructure on, 41

group interrelationships 16

survival in *Onchocerca*, 18*Trypanosoma*, 18

treatment of infection by

antypol, 13

congenere

in Gambia, 229

Gold Coast, 13

West Africa, 22

acquired resistance to antypol 920

cycle transmission by *G. palpalis*, (19)

effect of antypol on, 339

infection

treatment

diminution by 339

phenanthrene on, (176), 13 339

resistance, (19)

concomitant in French Guiana, (94)

craz

in insects of Arizona, 619

Onchocerca species, 449

rodent of Arizona, 619

excretion in chick embryo 340 344

liquid media, 714

culture by, effect on mice, (47)

effect of by ferrous acid and by hydro-

chloride on, 349

purification by antibiotics 344

experimental infection by 619

treatment

paraquat group 1131

penicillin, 1131

infection among blood-suckers in

Brazil, 813

in Uruguay 241

cardiac disease of, 60

complement fixation on, 20

mammary naturally infected in U.S.A.,

923

in mice, effect of antypol on, 339

in rodents, effect of antypol on, 339

ultrastructure on, 41

peritumoral infection, *p*-phenylene

diamine in, 1128

in mice, effect of trypanocidal ac-

tion, 70

prophylaxis, (970)

craz, 26

effect of antypol on, 339

ultrastructure on, 41

human laboratory infection, 1015

penicillin

in Africa, West, 222

in Central, 13

in South, 13

action of penicillin on, 18

in mice, (18)

effect of antypol on, 339

in mice, effect of antypol on, 339

in mice, effect of antypol on, 339

Trypanosoma

gambian—see,

infection of a mouse in Fernando P., 14

laboratory infection by, 917

oral chemotherapy in the U.S., 337

survival in *Onchocerca*, 18*Trypanosoma*, 18parasitizing *G. palpalis*, 1177

happens

effect of antypol on, (449)

metabolism of, (714)

survival in *Trypanosoma*, 18

infection and ascorbic acid metabolism in

the rat, 41

in mice

in mice, 176

infecting *A. californicus*, 176

leishmaniasis in rodents of America, (16)

resistance to infection

in America, in mice, 923

dogs, 923

Africa, 113

rhodocytosis

in Africa, (13), 13

differentiation of, 312

effect of antypol on, 339

ultrastructure on, 41

survival in *Onchocerca*, 18

similar

in Africa, West, 222

acquired resistance to antypol 919

infection in Belgian Congo, 22

in

in Africa, West, 22

Gambia, 229

Gold Coast, 221

acquired resistance to antypol 920

effect of antypol on, 339

infection, the insect by phenanthrene on,

223

Trypanosomes

action of trypanicide on, 117

and antypol compared, 1177

drug resistance, 1016

lectical charge of, 811

fluorescence in microscope, 100 for

237

sensitization effect of head compounds,

15

phenanthrene on, 1128

metabolism in *Trypanosoma*, 814

polymorphic, differentiation of, 81

trypanocidal, chemotherapy, 11

trypanocidal effect on, 41

vital staining for, 7

TRYPANOSOMITIS, 18 17 14 221

22 334-34 443-44 550

555 417-41 711 14 811

814 913-924 101 1019

11 112

in

in Africa, West, 222

West, 22

Belgian Congo, (13)

Gambia, 229

Gold Coast, 221

New Guinea, 22

in mice, effect of antypol on, 339

trypanosomiasis—*cont*animal—*cont*

treatment

anttrycide, 338

acquired resistance to, 919

dimidium bromide, (814)

MSb in experimental infection, 918

phenanthridinium, 223

compounds, (126)

bovine in Kivu, (448)

phenanthridinium in (19)

epidemiology in man and animals, 235

experimental, rôle of potassium as cause of death, 619

human, African (sleeping sickness)

in Africa, 123

East, 231

Belgian Congo, 224, 913

British West Africa, 221

Fernando Pó, 124

French Guinea, 712

French Equatorial Africa, 1907-1948, 1012

French West Africa, 123

Gambia, 222

Gold Coast 221

Kenya Colony, 237

Liberia, 224

Mozambique, 530

Nigeria, 221

Northern Rhodesia, 532

Portuguese East Africa, 531

Portuguese Guinea, 530, 1013

Portuguese West Africa 530

Sierra Leone, 222, 227, 238

cerebrospinal fluid, estimation of proteins in, 914

'close impersonal' contact with *Glossina*, 229close personal' contact with *Glossina*, 229

control

aggressive clearing, 223

Anchau Settlement Scheme, 229

Anglo Egyptian Sudan, 224

Angola 530

clearing methods in East Africa, 233

defensive clearing 223

game destruction in East Africa 233

Mozambique report for 1947, 984

Northern Rhodesia 532

Game and Tsetse Report, 1945 1946 and 1947 531

reclamation methods in East Africa 233
West Africa British organization of, 223

French 224

Gold Coast 226

Liberia 224

diagnosis in West Africa 222

entomological problems in East Africa 232

Foréam report, 1939-1945, 913

glucose content of blood 914

cerebro spinal fluid 914

ocular lesions in, 1177

10859

Trypanosomiasis—*cont*human, African (sleeping sickness)—*cont*

prophylaxis

anttrypol, 223

pentamidine, 123, 223, 1015

propamidine, 239

protozoal problems and research in East Africa, 232, 234

research, suggestions for, in the Gambia, 229

Gold Coast 227

reservoir hosts, 235

Sleeping Sickness Service in Portuguese Guinea 530

Summary of Recent Abstracts, 419-425

transmission

Tabanids, 235, 236

tsetse flies, 235 (*see also* under species)

treatment

anttrycide, fluorimetric determination of, (813)

anttrypol, 222

and tryparsamide, 222

arsenicals, resistance to, 533

arsenophenylbutyric acid (70A), 223

assay of neoarsphenamine, (448)

Bayer 205, 124

diamidines compared, 919

lomidine, 917, 918 (*bis*)

effect on blood sugar 918

melarsen, 238

oxide, 239, 711

Mel B, 711

pentamidine, 222

p-phenylene diguanidine, 1128

suramin (Anttrypol Bayer 205) estimation in blood and serum, 337

tryparsamide, 124

and 70 A 919

TPB, 711

problem in Africa, 122

veterinary aspects 236

human American (Chagas's disease)

in Brazil, 124

Catamarca 534

Chaco 534

Chile, 449, 1128

Corrientes 534

Ecuador 1017

Entre Rios 534

Formosa (South America), 534

Minas Gerais hospital, 620

Uruguay 241 619

cardiopathy in, 340

complement fixation in 20 1129

control

DDT, 449 1129

Gammexine 20 449 1129

Rhodiatox 1131

SNP 814 1131

diagnosis

complement fixation 20 1129

precipitin reaction 125

xenodiagnosis 241 (714)

Borzone's modification of Brumpt's method 1017

in school children 534

Trypanosomiasis—cont

- Part 2, American ICTS, due to—cont
retrocardiograph, chagasic, 1133
reservoir hosts, 46
risk of by blood tra- in, 813
social importance in Latin America, 820
transmission by blood-suckers, 1179
true mouse naturally infected in U.S.A., 923

Trypanosoma Glossina

- mechanism of feeding, 515
fly and trypanosoma—Carnegie report, 2923

Trypanosoma

- in se, Comparative Study of
T. panamensis and Tropical (Scratch
Type) T. panamensis (book
review), 28
book review, 78

Trypanosoma control in California, 500

Trypanosoma (hypertrophy) of female, 1022

Typhoid fever

- epidemiology of P. typhi OX19 in, 719

Typhoid wave—epidemiology, 716

TYPHUS GROUP OF FEVERS, in 30, 179

- 135, 44-53, 345-354, 450-
457, 536-544, 623-638, 715-
717, 817-823, 977-992, 1011
1026, 1135, 1138

in California, 718

- County Typhus, 97
Ethiopia, 450
Guadeloupe, 49 (p. 3)
Peru, 346
Seychelles, 365

in the Americas, 451

clinical study of German cases, 717

complement fixation in, (477)

control

in California, 500

County Typhus, 977

combined dust and spray with DDT, 24

dusting with insecticides, 718

acclimatization, 718

diagnosis

epidemiology (Proctor OX19), 716

Widal-Felix reaction in Peru, 45

endemic

in California, 718

Caracas, 718

Ethiopia, 344

Florida, 47

Indian rodents, 76

Japan, 23

Kentucky, 625

Mexico, 546, 625

Persian Gulf, 47, 5

Puerto Rico, 13, 45

Rio de Janeiro, 1021

Western Australia, 346

herds from rats and fleas in Lanchow

China, 76

complement fixation, 347

in rats in Mexico City, 719

control

during the DDT, 347

DDT effect on Chagasic index, 47

variety of method, (73)

in U.S.A., 47

Typhus Group of Fevers—cont

endemic—cont

- epidemiology with Panamanian strain
of Q fever, 41

diagnosis

complement fixation, 44

Widal-Felix test, 45

experimental, DDT analogue and, 413

infection in guinea pigs, peritonitis

benzocaine acid, 45

Rickettsiae infection of guinea pigs, 451

transmission, 4

Felix-Felix reaction, 44

treatment

insecticide, 43

chloroquine, 625

p-aminobenzoic acid, 45, 626

pH 8.5, 540

serum, 107

vaccination and body response to, 71

Widal-Felix test of rats in Mexico City

719

Widal agglutination, 719

Epidemic typhus

in Anglo-Egyptian Sudan, 101

Arabia, South-West, 1115

Bolivia, 131

Ethiopia, 344

Germany, 717

India, 47

Japan, 23

Mexico, 130, 346

(from endemic), 516

Oman, 23, 24, 25

Peru, 337

Siberia, 41

Turkey, 343

Ukraine, 22

blood chemistry in, 538

complement fixation in, 345

diagnosis

Widal-Felix test, 45

Widal-Felix and Widal compared, 5

equality of difference in from, 45

erythrocytic and merozoite in, 419

laboratory infections, 716

outbreaks in, 125

prophylaxis by erythrocyte and merozoite

rate, 5

prophylaxis

DDT, 344

vaccines in, 344, 519

Rickettsiae infection (guinea pigs, 4)

sympathetic nervous system disturbance

(46)

Tallia-Ara reaction in, 53

treatment

anticholinergic, 337

chloroquine, 625

p-aminobenzoic acid (P.A.B.A.), 45

serum, 107

vaccine (131)

experimental, 817

vectors in L.S.S.R., 41

Epidemic typhus—epidemiology—cont

in Mexico, 41

Typhus Group of Fevers—*cont*

Exanthematic typhus [FONSECA and WOHLWILL] (book review) 1195

First Inter-American Conference, 715

immunity

effect of splenectomy, 928

mite-borne

tsutsugamushi disease

in Assam, 133

Batavia, 1024

Burma, 133

Calcutta 718

China, 1024

Ethiopia, 451

India, 719, 721

Malaya (scrub typhus) 247, 1135

breeding of *Trombicula deliensis* in the laboratory, 721

clinical features, 133 719

diagnosis in laboratory, 719

infection after vaccination, 722

persistence of *Rickettsia* in the blood 1024

prophylaxis

chloromycetin, 453

impregnation of clothes, 540

treatment

chloromycetin, 27, 453, 626, 1136

para-aminobenzoic acid, 28 626

unusual features 1024

vaccine 27 348

no protective value 1137

murine *see* Endemic typhus

optic neuritis in, 452

unsuitable name for many *Rickettsial* diseases, 248

Proteus OX19

agglutination in pregnancy 129, 538

antibodies in typhus and other patients, 24

common antigenic factor with *Rickettsiae*, 927

glucolipoid extract, Weil-Felix reaction and precipitation of 130

Q fever (626)

in Anatolia 352

Britain, 454

California, 252 352, 353, 454, 727, 932 1138

Germany 351

Greece 28

Israel, 1026, 1137

Panama, 455

Pennsylvania, 455

Rumania, 627, (930) 931

Switzerland, 134, 454

Texas, 726

U.S.A. cattle, 456

a cow 353

clinical aspects in California, 727

features, 932

complement fixation in, 1026, 1137

sheep and goats in California, 1138

U.S.A. 726

conglutination complement absorption test in 456

control in California, 500

cross immunity of Morocco Ankara and Izmir strains, 352

Typhus Group of Fevers—*cont*

Q fever—*cont*

diagnosis

complement fixation 627

from atypical pneumonia, 352

retrospective in Rumania, (931)

disproof of in New Zealand 932

encephalitis in, 1026

experimental in cattle 135, 726

Aedes aegypti not a transmitter, 455

Dermacentor andersoni a capable transmitter, 455

house-fly a mechanical transmitter, 456

not a capable transmitter, 456

history, 726

immunity reactions between Panamanian

strains and endemic (murine)

typhus, 253

laboratory infection, 253, 626, 931, 1026

possible, 455

laundry infection from soiled clothes 457

milk as source of infection, 28, 29

Pasteurization and, 823

post mortem findings in 822

probable dust infection, 626

serological tests compared, 456

survey, (541)

epidemiological, in Southern California 454

susceptibility of fleas to *Rickettsia* of, 818

treatment

aureomycin, 932

streptomycin, (457), 932

veterinary public health significance of, (134)

reticulocytes in, 928

Rickettsia spp

common antigenic factor in, 927

recovered from *Hydromys humei* in Palel 722

rats in Palel 722

tree shrew 722

Tupala belangeri 722

Rickettsia

akari, cause of *Rickettsial*pox, 248

burneti

antigens specificity of, 727

in butter, 455

cows 455

raw milk in Texas, 726

cause of "virus pneumonia", 29

complement fixation with syphilitic sera, 727

infection of man and animals in Greece 29

laboratory infection, 931

relationship with organism of epidemic bronchopneumonia, 541

strain differentiation 931

survival *in vitro* 627, (930)

mooseri

infection of insects with, 451

inoculation of fish 625

nomenclature of, 452

variation in growth habits 623

Ulcer, Tropical—*cont*

treatment, 397, 1083

Aerva tomentosa 781

aluminium 87

Exadyl intra-arterially, 1181

and novocaine intra arterially, 1181
sympathetic lumbar infiltration, 1181

extradural block 285

lalis bark 781

Marfanil 969

penicillin 969

surgical, (970)

varieties, 397

Veldt sore 398

Incinaria stenocephala in dogs in Szechuan,
376*Jranotaenia**lowi* in Bonaire 675*ornata*var *musarum* breeding in plant axils, 172*Vallisneria spiralis* and cultivation of *B. truncatus* 946*P. boissii* 946

Vectors arthropod, control 500

Venezuela, survey of natural history (100)

VENOMS AND ANTIVENENES, 81-83, 280-
281 393 394 493-494 568-
569 775-777 866 868, 967-
968 1076 1169 1170

bee stings

symptoms, 569

treatment

calcium gluconate 569

poisonous fauna of Argentine, 967

scorpions

of Argentine, 968

Mexico 775

North Africa, 280 775, 868

Palestine 867

Brachysternus ehrenbergi 394*Buthus occitans* 776*Centruroides limpidus* 776*noxius* 776*Hottentota gentili* 776Mexican and North African compared,
775*Prionurus**amoureuxi* 776*australis*, 776*hoggarensis* 776*Scorpio maurus*, 776

physiological actions of, 776

symptoms, 867

treatment by serum, 280, 867

Snake

agglutination of red cells by, 1076

Bothrops release of bradykinin from
plasma by action of 866*jararaca* 82

'spreading factor' 82

Bungarus caeruleus, detoxification by
carbolic soap, 867

Copperhead

agglutination by, 1076

haemolytic action of, 1076

Coral, of Argentine, 967

Venoms and Antivenenes—*cont*Snake—*cont**Crotalus**adamanteus* haemolytic action 1076*terrificus* dermatotoxic action, 82

flocculation with antivenom, 82

'spreading factor', 82

Daboia, mode of action, 775

Haemolysis caused by, 1076

Moccasin

agglutination by 1076

haemolytic effect of 1076

Vipera ammodytes hypersensitiveness in
man and animals (1076)

Spiders

in Argentine 968

Chile, 1169

*Latrodectus**mactans* 1169

control

Gammexane 569

physiological effects of, (1076)

symptoms 394

treatment

calcium gluconate, 394

pallidus 1169*revivensis*, 1169*L.P.III-guttatus* 1169

Verrucosis, lymphostatic

in Kenya, 283

diagnosis from Mossy foot, 283

Verruga peruviana

in soldiers returned to U S A, 777

control by DDT, 1027

Vibrio cholerae see under Cholera

Virus diseases among Africans, 971

Vitamin

glossitis and deficiency, 657

inability to use, as cause of glossitis, 658

A deficiency

diarrhoea and, 389

ocular and dermal lesions 389

B deficiency

in Gold Coast, 278

pathological anatomy of, 1072

B₁ deficiency after locust visitation, 767B₂ in pellagra, 389B₁₂ in blood regeneration, 566

macrocytic anaemia, 80

pernicious anaemia, 80

sprue, 80, 391

C content of *Detarium senegalense* 1096

deficiency and petechiae in malaria, 903

in treatment of blackwater fever, 913

Vitiligo, diagnosis from leprosy, 369

*Viviparus**javanicus* second intermediate host

echinostome in Java 63

rudipellis second intermediate host

echinostome in Java, 63

von Halleberg method of staining *M. lepro*
842

Wasp, Bethyloid, in Sierra Leone, 403

Water plants and culture of snail vectors
schistosomiasis 946

- Wuchereria bancrofti* near § of, 48²
- Wells' disease in Ecuador 373
- Wells-Elliott reaction in typhus and non-typhus fevers, 45
- Why our Children die Causes and Suggestions for Prevention of Infant Mortality in West Africa. (Owen Muro) (Book review) 425
- Wuchereria* *W. albo filariae*
- Wuchereria*
 in Ceylon mosquitoes, 416
 index in *Martini* 774
 infectio
 in Anglo-Egyptian Sudan, 957
 Curaçao 408
 Netherlands Windward Islands, 408
 leptamastix and, 385
 treatment
 anthelmintic 116
 arsenamide 69
 nature of embryo sheath, 76
 transmitted by *A. foveolatus* in New Guinea, 1105
 A. gambianus in Portuguese Guinea, 1105
 A. punctulatus in New Guinea, 1105
 malarii
 elephantiasis of, 385
 in Ceylon mosquitoes, 416
 infection in child of 13 months, 274
- Wuchereria perfolia* elephantiasis and, 315
- Xanthosoma repens* and mosquito breeding, 173
- Xenodermoculture or Xenodiagnosis. *Al* (714), 534 1017
- Xenopsylla*
- anna*
 on rats in Rangoon, 256
 Saigon, 357
- cheopis*
 on rats in Kentucky 625
 Mexico 819
 Mexico City 499
 Rangoon, 256
 Saigon, 357
 reduction by dantrolene with DDT 47 347
- Y. T. Tse and Bruce Johnson
- Yam, Poisonous Wild Clusters are *Dioscorea* *dumetorum*
- Yamoussi method (scoring of) up to distinguish from *M. tuberculosis* 847
- Yard, local area for Argentine *Eutropha* 957
- YAWS, 45 47-48, 502 - 819 1044-1045
 in 11, 511
 Ind. China, 1049
 Sierra Leone, 547
 wild virus introduced to U.S.A. 777
 Siam, 47
 Uganda, 47²
 re-infection 550
 bone lesions (47-2, 839)
 compared with those of syphilis, 478
 campaign in Sierra Leone 447
 classification of, 47²
 control, 551
 evolution according to, 550
 incidence, in guinea and, 550
 season and, 550
 social status and, 550
 secondary
 a social disease in (3-2) China, 1049
 and tertiary stages, lesions of, 1050
 treatment
 antibiotics, 550
 bismuth, 45, 550
 mercuric, 45
 and bismuth combined 49
 penicillin, 551
 STB, a new test for, 819
- YELLOW FEVER, 146-157 33 45 48 54, 543 6, 2 3-2 4 91 923
 10 7
 in Belga Congo 134
 Panama, northern, 1139
 control by DDT 345
 epidemic among monkeys in Senegal forest, Western Uganda, 8 1
 in Central Africa, 91
 epidemiology complement station and, 137
 in human by mouse animals in Belg Congo 136
 data on, of, 54
 isolation of virus from *Aedes* spp. and 457
 Jungle
 in Brazil, 1027
 Kenya, 54,
 Uganda 2, 3 91
- Yellow fever malaria and 8 days (Ghana) (Book review) 183
- monkey to man infect in Central Africa, 931
- Nigeria Min. of Health, (1957)
- prophylaxis
 against STD and French virus compared, 3 5
- Summary of Recent Abstracts, 101 10
- transmission by *Aedes* *triseriatus* 41 4 8 673
- vaccination by STD reaction (vol. 673)
- various (1 and 2) in monkeys, 137
- Zoophilism of mosquitoes in Southern France 1105
- Zootermopsis* *argentinae* laboratory culture of, 973

INDEX OF COUNTRIES

EUROPE

- Corsica
Anopheles, 315
 malaria, 315
 plague, 736
 rabies, 728
- Czechoslovakia
Anopheles of Bohemia and Moravia, 800
- Europe
 malaria, 425
- Finland
Anopheles 205
 haemoglobin values, 1074
 malaria, 205
- France
 amoebiasis in Paris 362
Anopheles, 1103
 cholera epidemiography, (143)
 coenurosis, 950
 dysentery, 941
 fascioliasis, (153)
Hymenolepis 951
 malaria, 112, 695, 696, 949, 1103
- Germany
Anopheles 426
 helminthiasis, 1054
 malaria, 426, 696
 Q fever, 351
 typhus, 717
- Gibraltar
 myiasis, 1178
- Great Britain
 amoebiasis, 42, 936
 mosquitoes, 500
 Q fever, 454
 toxoplasmosis, 401
- Greece
 malaria, 316
 Q fever, 28
- Hungary
Anopheles 896
 malaria, 896
- Ireland
 typhus in Tyrone, 927
- Italy
 amoebae in animals in Rome, 179
Anopheles 8, 315, 437, 800
 coccidiosis, 942
 enterobiasis, 1071
 leishmaniasis, 1020, 1134
 malaria, 8, 109, 114, 315, 513
Phlebotomus 1134
- Mediterranean area
 amoebiasis in forces returning from, 362, 469
 leishmaniasis, (340)
- Netherlands
 amoebiasis, 828
Anopheles 315
 malaria, 314

- Poland
Anopheles 1000, 1104, 1105
 malaria, 999
 rodent ectoparasites, 1144
- Portugal
 nnylostomiasis, 1062
 ascariasis 1062
 fascioliasis, 62
Phlebotomus, 94
 schistosomiasis, 1056
 trichuriasis, 1062
- Rumania
Anopheles, 1115
 deficiency diseases 162
 malaria, 1115
 Q fever, 627, (930), 931
 relapsing fever, 45 838
- Sardinia
 malaria, 117, 605
- Sicily
 leishmaniasis, 128
- Spain
 leishmaniasis, 126
 malaria, 427
 myiasis, 93
- Sweden
Anopheles 205
 malaria, 205
- Switzerland
 Q fever, 134, 454
- U.S.S.R.
Phlebotomus, 535
 typhus, in Siberia, 248
- Yugoslavia
Phlebotomus (675)

ASIA

- Aden
 amoebiasis, 939
- Arabia
Anopheles 516, 517
 typhus, 1135
- Assam
Anopheles 217, 1002
 typhus, 133
 ulcer, tropical, 86
- Borneo
 filariasis, 67
 malaria, 909
- Burma
 amoebiasis in forces returning from 469
 anaemia, 491
Anopheles, 210, (517), 1002
Bandicota bengalensis in Rangoon, 256
 malaria, 210
 mosquitoes, 210
 plague, 256
 rodent ectoparasites 256
 typhus, 133

Ceylon

- Asiatic malarial f. 487
Anopheles 41 (517)
Amegilla *albimanus* malarial, 487
 malaria, 485
 PA. *Amegilla*, 9 4 9 3

Ch.

- amictus* in Y. I. Tex. 366
ankylostomus 4, 495
 dysent. in Szechuan, 376
Anopheles 1 603
 in Szechuan, 479
 Malaria in fever 603
 cholera, 359
Clonorchis sinensis 15
 in Shanghai 648
 Szechuan, 376
coccidiosis, 761
gnathostomus, 1070
helminthiasis, 376
leishmaniasis, 179 44, 54
 malaria, 19 4, 8
 mosquitoes, 181
 plague, 256, 257
 relapsing fever 471
 rodent ectoparasites, 357
schistosomiasis, 60, 479 559 647 648
 tapeworm in dysent. 376
 typhus, 1024
 in Punjab, 344

Cochin-China

- malaria, 328
 plague 357

Cyprus

- A. phel.* 4, 807
 malaria, 16
 relapsing fever 470

Far East

- deficiency diseases, 71

India and Pakistan

- amictus*, 4 6, 469 741 939
 in forces returning from, 36, 469
anemia in Punjab 771
Anopheles, 11 17 110, (517)
 cholera in Bengal, 43
 deficiency disease 73 389 767
 dysentery 741
leishmaniasis, 176, 6, 925
 leprosy 45 373 370 745
 malaria, 6 11 16 17 107 110, 436, 612
 plague 33 34 35 934
schistosomiasis, 947
 serum 770 861 945
Trichinella del. m., 820
Trichinella malabarica in *A. caliciflora*,
 126
 typhus in Calcutta 718 719 771
 for tropical, 9 9

Indo-China

- Anopheles* 706
 mal. in, 276 705
 myxoma, 15
 rodent ectoparasites in, 357
 typhus, 3
 in, 104

Iraq

- public health 417
schistosomus in, 354 515 845
 Israel (see also Palestine)
 Q fever 1024 1137
 typhus, 820
 verona, 847

Japan

- Asiatic malarial f.* in Kamato, (479)
amictus in, 347
ankylostomus 7 Okla. in, 154
Anopheles in Formosa, 900
ascaris in Okla. in, 155
coccidiosis, 261
gnathostomus in, 1070
helminthiasis in Okinawa, 154
 malaria, (429)
schistosomiasis, 48
 trichinosis in Okinawa, 155
 typhus, 23
 in Korea, 23

J.

- Asiatic malarial f.* in Okinawa 63 64
leishmaniasis, 269
 rodent ectoparasites in, 63
 typhus in Bacteria, 1024

Lithuania

- Anopheles* in Lithuania, 707
 malaria, 1109

Malaya

- Asiatic malarial f.*, 709
 Malaria in disease in Singapore, 73
 deficiency diseases, 73, 277 78
gnathostomus 4, 857 1071
 health control, 105 (5 42, 518 987)
 typhus, 47 1135

Netherlands East Indies

- schistosomus*, 83
amictus in, 145
Anopheles 110
 malaria, 110
schistosomiasis, 59
 yaws, 45

North Borneo

- Anopheles*, (190), 100

Palestine (see also Israel)

- relapsing fever 1045

Persia

- amictus* 4, 63
 dysentery 83
 relapsing fever 43

Persian Gulf area

- typhus, 25

Philippines

- amictus*, 954
ankylostomus 4, 954
Anopheles 41
 in, 15
 malaria, 15
 berberis, 370
schistosomus in, 15
 malaria, 101 3
schistosomiasis, 157
trichinosis, 15

Syria

- schistosomus* 11502 845

Thailand
Anopheles, 11
 gnathostomiasis, 1069

Turkey
 histoplasmosis, 84
 leishmaniasis, 21
 Q fever, 352
 rabies, 139
 typhus, 343

AFRICA

Abyssinia (see Ethiopia)

Africa
 anaemia, 665
 trypanosomiasis, 123

Africa, Central
Aedes, 932
 cardiovascular disease, 575
 health conditions, 179
 malaria, 428
 schistosomiasis, 846
 yellow fever, 932

Africa, East
Anopheles, 209
 deficiency diseases, 158
Glossina, 532
 leishmaniasis (1133)
 mosquitoes 172
 schistosomiasis, 266, 555
 trypanosomiasis, 231
 ulcer, tropical 285

Africa, French Equatorial
 ankylostomiasis in Gabon, 844
 ascariasis in Gabon, 644
 blackwater fever, 120
 intestinal parasites, 844
Strongyloides 844
 trichuriasis 844
 trypanosomiasis, 1012

Africa French West
Glossina 921
Phlebotomus (499)
 relapsing fever, 1046, 1047
 trypanosomiasis, 123, 224

Africa, North
 amoebiasis, 546
Buthus occitanus stings 280
 leishmaniasis, 1132
 relapsing fever 42 838

Africa Portuguese East
 schistosomiasis 1056
 trypanosomiasis 531

Africa Portuguese West
 trypanosomiasis, 530

Africa West
 Anchau Settlement Scheme, 229, 1128
Anopheles 697
 deficiency disease, 964
 experimental animal colony 587
 loiasis 563
 relapsing fever 1046
Trypanosoma simiae 222
 trypanosomiasis 221, 222

Algeria
 malaria, 897
 schistosomiasis, 1153

Anglo-Egyptian Sudan
Acanthocheilonema perstans, 957
 deficiency diseases, 74
 filariasis, 956, 957
 onchocerciasis, 957
Simulium, (387), 404
 trypanosomiasis 224
 typhus, 1021

Angola
 trypanosomiasis, 531

Bechuanaland
 water resources, 676

Belgian Congo
Acanthocheilonema perstans, 602
Anopheles 330, 601
 health of 1189
 leprosy, 146
 malaria, 214 601, 699, 897, 908
 mosquitoes 329
 plague, 737
 public health report, 415, 1189
 schistosomiasis, 754
Simulium, 387
Trypanosoma uniforme, 224
 trypanosomiasis, 224, (338), 913
 typhus 22
 yellow fever, 136

Cameroons
 filariasis 563, 1066

Cape Verde Islands
Anopheles 208, 209
 malaria 208

Egypt
Anopheles 438, 516, 523
 Ayerza's disease 847
 balantidiasis, 942
 cholera, 359, 462, 1029
 deficiency diseases, 389
 dysentery, 942
 malaria, 438
 schistosomiasis, 57, 150, (380) 643, 646, 845

Entrea
Anaplasma marginale in rodents of Asmara, 1161
Bartonella muris in rodents of Asmara, 1161
Hymenolepis, 1161
 malaria 213 (696), 705
 typhus, 344

Ethiopia (Abyssinia)
 ascariasis 1033
 intestinal parasites 1032
 leishmaniasis 342
Phlebotomus 1088
 schistosomiasis, 1033
 tapeworm infections, 1033
 trichuriasis, 1033
 typhus, 450, 451

Fernando Pó
 diseases 880
Glossina 124
 trypanosomiasis, 124

AMERICA, SOUTH

America South

Leishmaniasis 84 161 3 7
 Leishmaniasis 1 7
 Trypanosomiasis 334

Argentina

Anopheles 332
 Helicobacter (4)
 Coercit. idomycon 167 1173, 1175
 Dysentery (4)
 Histoplasmosis 963
 Hydatid disease (106)
 Malaria 1000
 Trypanosomiasis 334
 Ulcerative colitis (4)
 Cholera 967

Bolivia

A. phlebotomus 18
 Malaria 18
 Typhus 131

Brazil

Amph. vivax 930
 Bacteri
 m. J. Jan. 666
 São Paulo 861
 Nephelomastix 863
 Anopheles 319
 In Amazonia 331
 Rio de Janeiro 314
 A. phlebotomus 847
 Chagas's disease 879
 Deficiency diseases 161
 Health conditions 1190
 Helicobacter 483
 Leishmaniasis 343 714
 Leprosy 49 53 1148
 Malaria 331 513
 Rural hygiene 1191
 Schistosomiasis 643 847 1048
 Strongyloidosis 813
 Trichuriasis 1701
 Tropical disease 1190
 Trypanosoma cruzi in blood donors 813
 Trypanosomiasis 1 4 620
 Typhus 142 719 930
 Yellow fever 10 7

British Guiana

Aedes aegypti control 1120
 A. phlebotomus 18
 A. phlebotomus 18
 Malaria 389 634
 Leprosy 763
 Settlement Commission report 50

Chile

A. phlebotomus 1006
 m. T. rapax 11
 Hydatid disease 8 9 1
 m. l. 1008
 m. l. 1087
 m. l. 894
 Typhus 114 449 11 8

Colombia

Amph. 1 698
 Chrysops 1921
 Helm. m. l. 1095
 Intestinal parasites 10 3
 Leishmaniasis 666
 Leprosy 53
 Phlebotomus 666 668
 Relapsing fever 357

Dutch Guiana

A. phlebotomus 698

Ecuador

Actinomyces 573
 Amphis. m. ch. l. 573
 B. r. r. r. 573
 Brucella 573
 Chromobacterium 573
 Climate and disease 57
 Coercit. 573
 Dysentery 573
 Glaucoma 573
 Helicobacter 573
 Hydatid disease 573
 Intestinal parasites (176)
 Leprosy 573
 Malaria 573
 Plague 573
 Rabies 573
 Relapsing fever 567
 Trypanosomiasis 1017

French Guiana

Amph. 1 843
 Anopheles 1 701
 Leprosy 477
 Malaria (587)
 Phlebotomus 1941 (587)
 Trypanosoma cruzi (974)

Suriname

Amph. 1 318
 Glaucoma 274
 Intestinal disease (451)

Paraguay

Amph. 1 36

Peru

A. phlebotomus 17
 Deficiency diseases 140
 Malaria 301 1077
 Typhus 337

Uruguay

Hydatid disease 73
 Rabies 140
 Trypanosoma cruzi 41
 Trypanosomiasis 41 619

Venezuela

Amph. 1 10 11 1 111
 Malaria 1 773
 Helm. m. l. 773
 H. m. l. 773
 Malaria 10 11
 Phlebotomus 1941 8
 Plague 5
 Rabies 3 3
 Schistosomiasis 76 7 5 7 4
 Typhus 773
 Typhus 18

AUSTRALASIA

Australasia

Aedes (974)

Australia

Aedes australiensis in Queensland, (581)

anaemia, 966

ankylostomiasis in Queensland, 852

Austrosimulium bancrofti in Queensland
406

health of aborigines, 1098

histoplasmosis, 397

leprosy, (368)

in Queensland 841

mosquitoes, (581)

Simulium in Queensland, 406

toxoplasmosis in Perth 875

typhus 346

PACIFIC ISLANDS

Fiji

anaemia, 392

deficiency diseases, 768

Micronesia

health service programme, 585

New Caledonia

filariasis, 155

New Guinea

Aedes 1187*Anopheles* 1105

filariasis, 1105

malaria, 602

South West Pacific

coccidiosis 261